This electronic version (PDF) was scanned by the International Telecommunication Union (ITU) Library & Archives Service from an original paper document in the ITU Library & Archives collections.

La présente version électronique (PDF) a été numérisée par le Service de la bibliothèque et des archives de l'Union internationale des télécommunications (UIT) à partir d'un document papier original des collections de ce service.

Esta versión electrónica (PDF) ha sido escaneada por el Servicio de Biblioteca y Archivos de la Unión Internacional de Telecomunicaciones (UIT) a partir de un documento impreso original de las colecciones del Servicio de Biblioteca y Archivos de la UIT.

هذه النسخة الإلكترونية (PDF) للاتصالات الدولي الاتحاد في والمحفوظات المكتبة قسم أجراه الضوئي بالمسح تصوير نتاج (ITU) والمحفوظات المكتبة قسم في المتوفرة الوثائق ضمن أصلية ورقية وثيقة من نقلاً.

此电子版（PDF版本）由国际电信联盟（ITU）图书馆和档案室利用存于该处的纸质文件扫描提供。

Настоящий электронный вариант (PDF) был подготовлен в библиотечно-архивной службе Международного союза электросвязи путем сканирования исходного документа в бумажной форме из библиотечно-архивной службы МСЭ.

© International Telecommunication Union

telecommunication journal

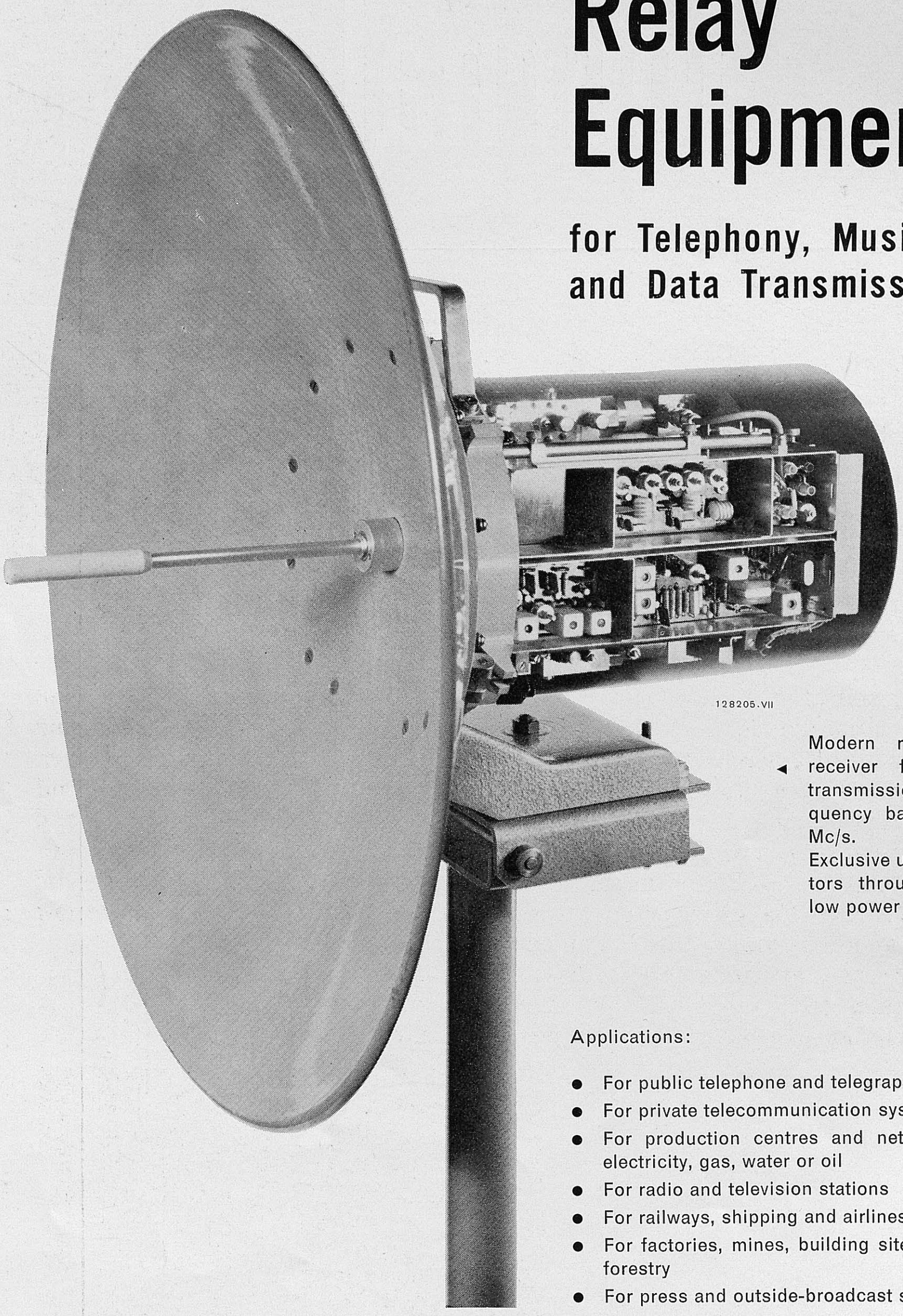
MONTHLY MAGAZINE OF THE INTERNATIONAL TELECOMMUNICATION UNION — 15 MAY 1965

NAPOLEON III — SPONSOR OF THE ITU 100 YEARS AGO

BROWN BOVERI

Microwave Relay Equipment

for Telephony, Music Links and Data Transmission



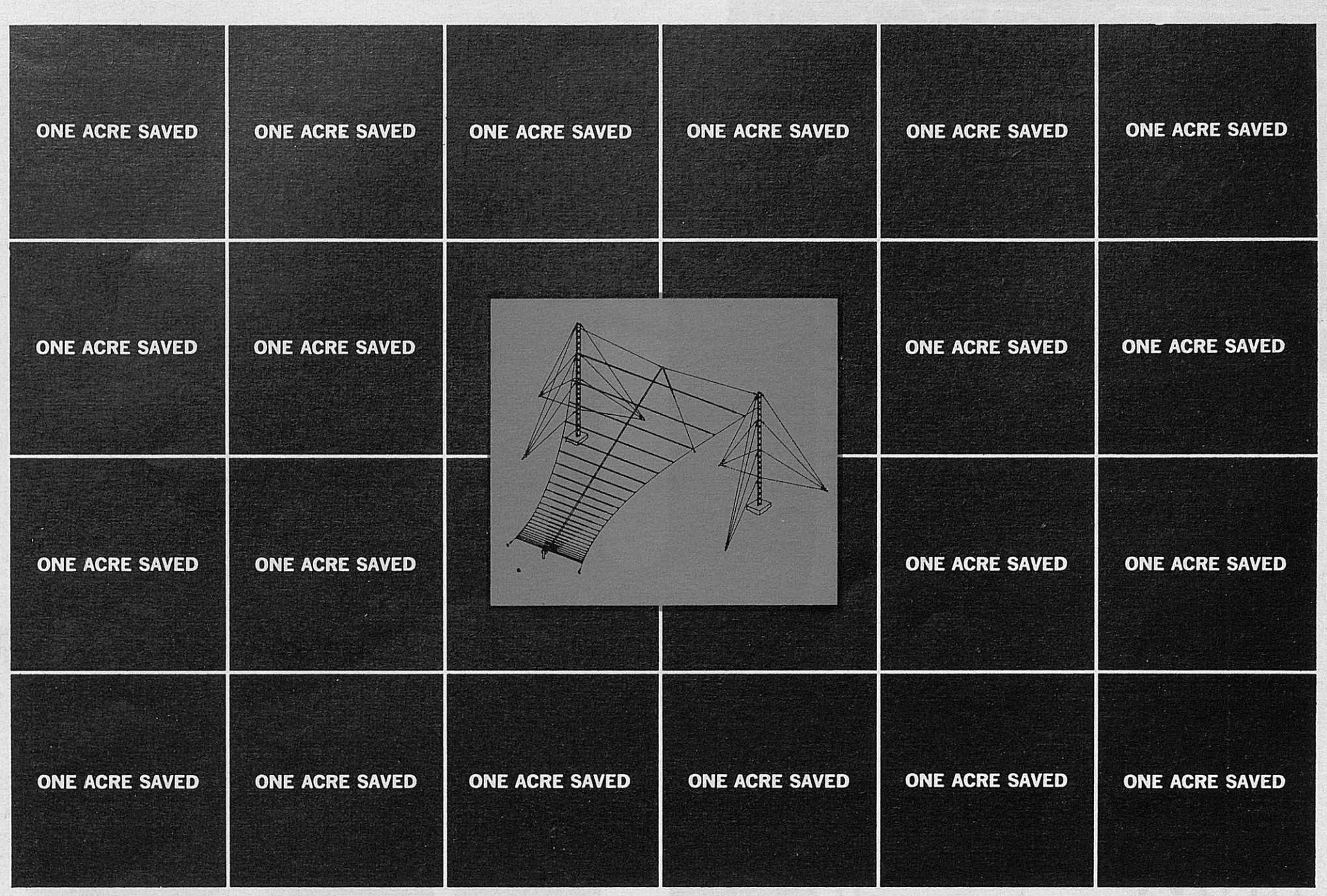
128205.VII

◄ Modern radio transmitter receiver for multichannel transmission in the frequency band 6400 to 8000 Mc/s.
Exclusive use of semiconductors throughout—extremely low power consumption.

Applications:

- For public telephone and telegraph networks
- For private telecommunication systems
- For production centres and networks distributing electricity, gas, water or oil
- For radio and television stations
- For railways, shipping and airlines
- For factories, mines, building sites, agriculture and forestry
- For press and outside-broadcast services

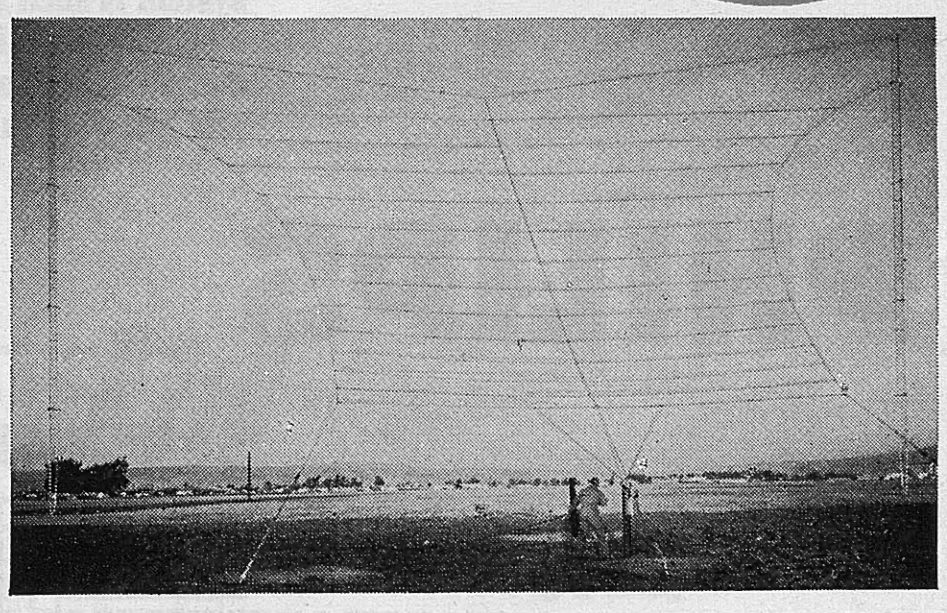
BROWN, BOVERI & CO., LTD., BADEN (SWITZERLAND)



How to save acres and acres on a crowded antenna farm

For short-haul, point-to-point, h-f communications, this Granger Associates broad-band log-periodic antenna, Model 747-2.5/30, can be installed on a 3½ acre rectangle, and actually covers about 2 acres. It replaces at least two and perhaps three rhombic antennas, each requiring from 7 to 14 acres. It offers a 10.2-db gain at a frequency-independent vertical take-off angle of 45% over the 2.5—30 Mc range. VSWR is low (2:1) and efficiency is greater than 90%. It needs no ground screen, and is not seriously affected by a poorly conducting ground. For optimum sector coverage at varying distances, a special version provides take-off angle inversely variable with frequency. These antennas are now in production and in service in the U.S. and abroad. Unless you are in the market for real estate, you will want details on this and other broad-band log-periodics (plus other h-f communications systems components) from the nation's fastest-growing supplier of h-f antenna systems.

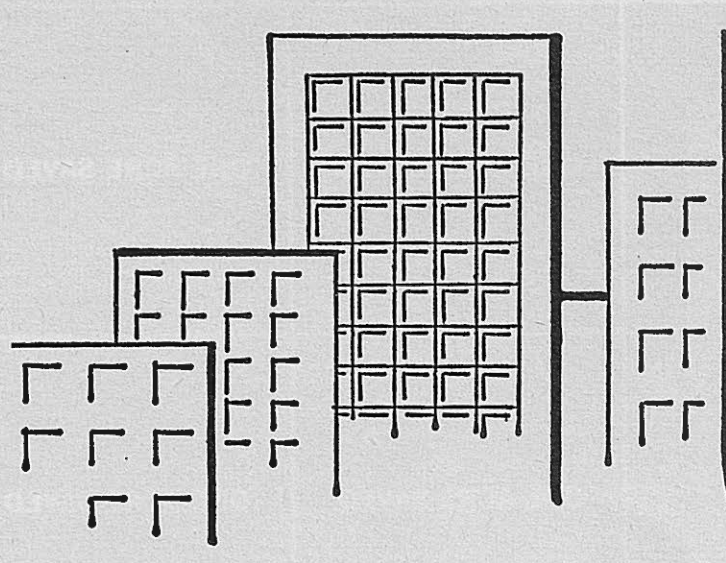
Granger Associates



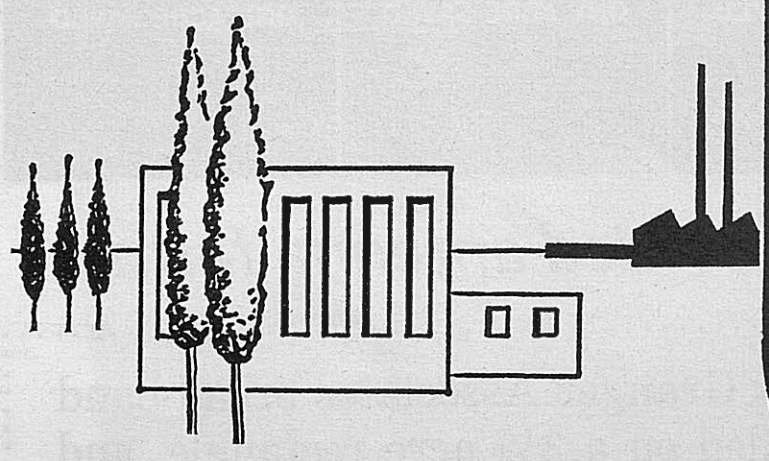
Model 747-2.5/30 log periodic h-f antenna

Granger Associates, 1601 California Avenue, Palo Alto, California / Granger Associates, Ltd. Ruo House, Broom Way, Weybridge, Surrey, England

for all the various requirements of Public Telephony



UR



UD

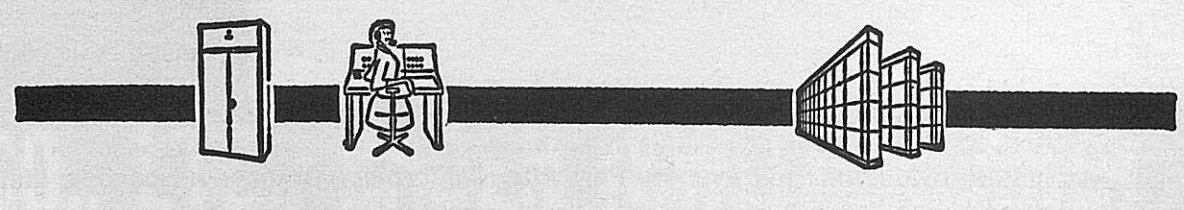
The term "public telephony" covers an extremely wide field of activity, in which the requirements to be met by the equipment vary immensely. Yet there is no case where a type UR or UD Philips exchange cannot be supplied to fit the bill.

The PHILIPS UR range comprises not only independent exchanges for any capacity above 200 lines but complete networks of that type. The system is such that every facility desired can be incorporated in it.

The PHILIPS UD system consists of cabinets each of which forms a complete 50-line unit. Such units do not require continuous supervision and are particularly suitable for rural districts.

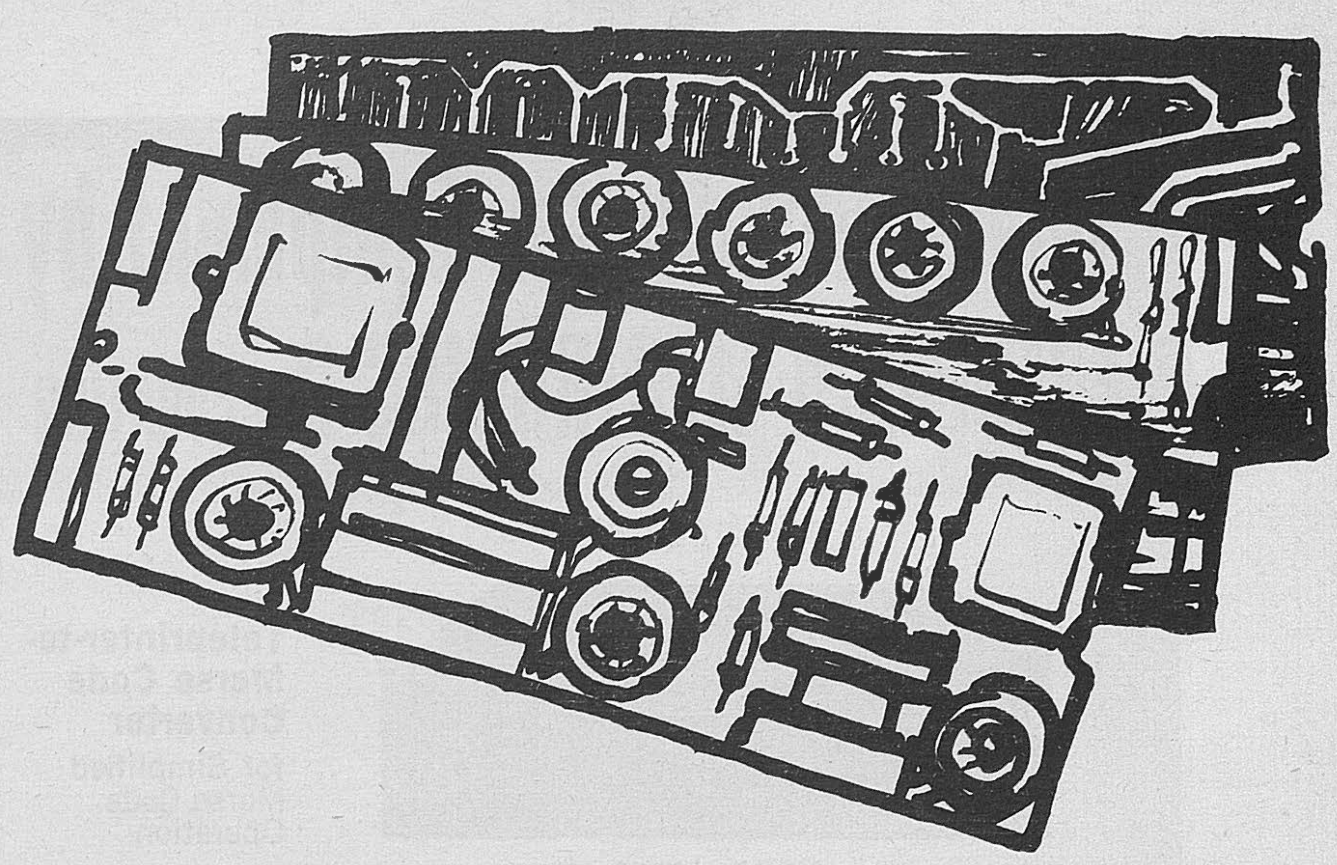
PHILIPS

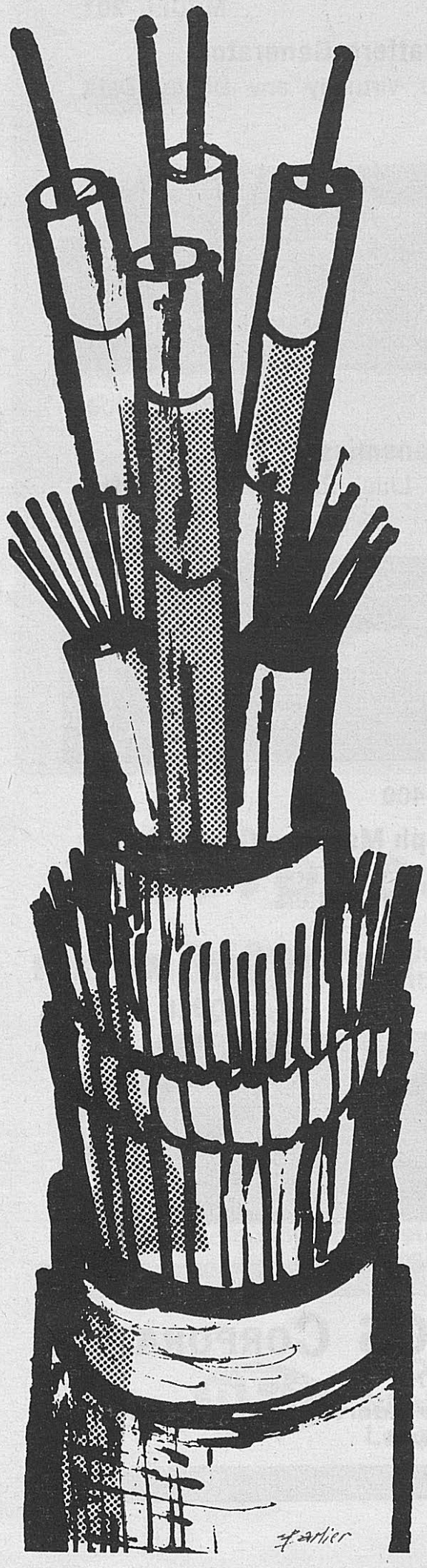
N.V. PHILIPS' TELECOMMUNICATIE INDUSTRIE HILVERSUM THE NETHERLANDS



1732-E

an advertisement in Philips KEY CAPITALS series





TELECOMMUNICATIONS

The Department of Nuclear Energy, Telecommunications and Electronics of the S.A.C.M. (Société Alsacienne de Constructions Mécaniques), rechristened ALCATEL, is continuing its cooperation, dating from the beginning of the century, with French Mail and Telecommunications Administration.

ALCATEL designs and builds :

- long-distance telecommunication cables with their carriercurrent multiplex telephony equipment and repeaters.
- ALCATEL is carrying on investigations in the field of pulse techniques.

In particular, it is building :

- equipment for long-distance transmission over normal telephone circuits of binary digital data at the rate of 1,500 pulse figures per second.
- delta-modulated multiplex telephone equipment, particularly adaptable to secret communications.

ALCATEL supplies and installs most of French radio-broadcasting low-voltage equipment.

- sound recording; modulation distribution; fixed magnetophones.

Alcatel

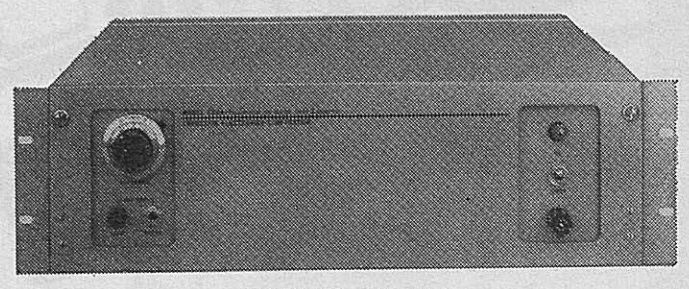
SOCIÉTÉ ALSACIENNE DE CONSTRUCTIONS ATOMIQUES, DE TÉLÉCOMMUNICATIONS ET D'ÉLECTRONIQUE

69 RUE DE MONCEAU, PARIS 8e FRANCE

impact

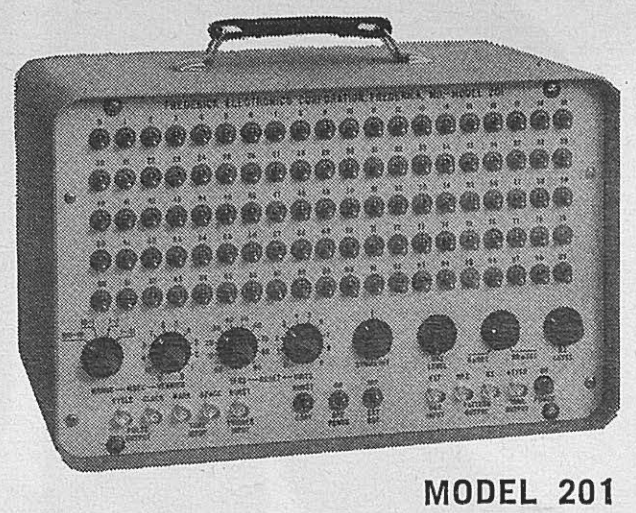
Telecommunication Equipment by FREDERICK ELECTRONICS CORPORATION

A communications electronics company experienced in the design, development and manufacture of data transmission and telegraph equipment.



MODEL 660A

Teleprinter-to-Morse Code Converter
for Simplified Morse Code Operation

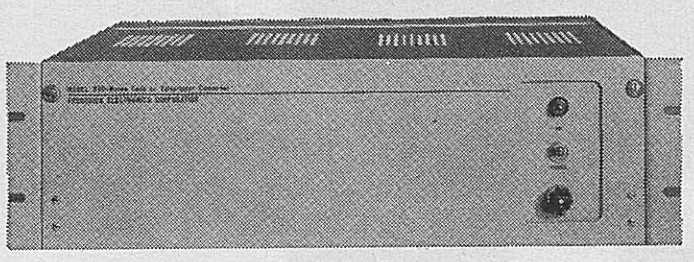


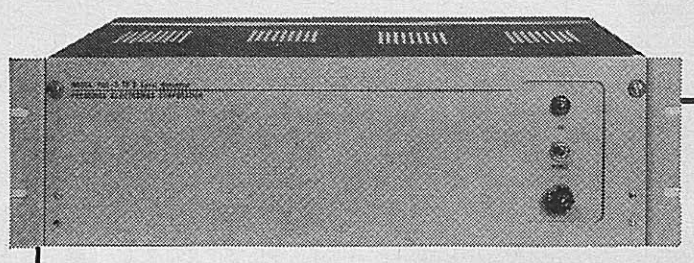
MODEL 201

Pulse Pattern Generator
simulates virtually any Digital Data Signal

Morse to Teleprinter Converter
for Simplified Morse Code Operation

MODEL 670



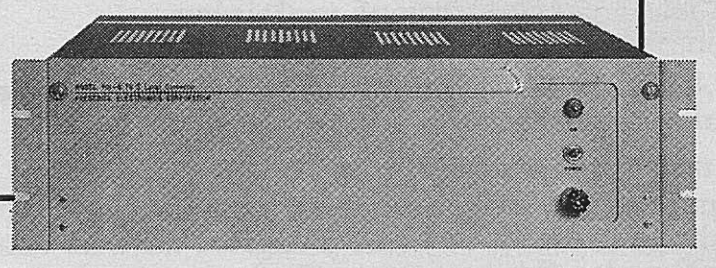


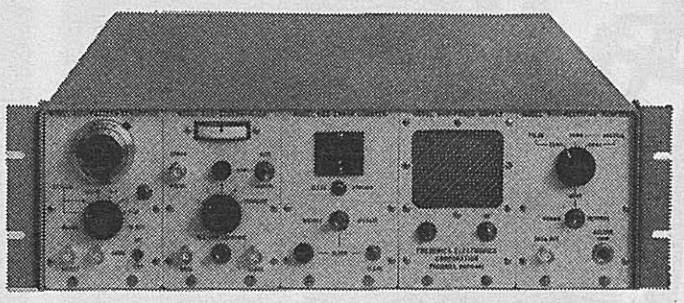
MODEL 700

5 Level to 8 Level Converter
provides interface between standard 5 level Baudot circuits and the new 8 level ASCII

8 Level to 5 Level Converter

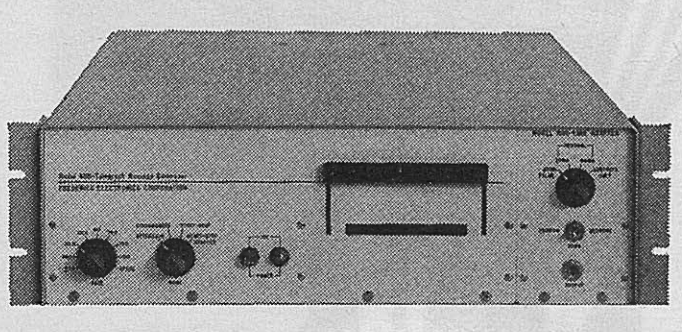
MODEL 701





MODEL 600

Data Transmission Test Set
for Wire Line, Radio and Recorded Systems

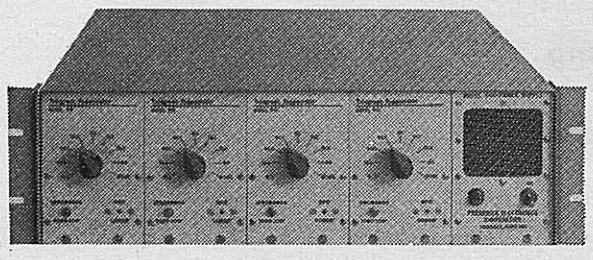


MODEL 400

Telegraph Message Generator
replaces most Tape and "Canned" Message Transmitters

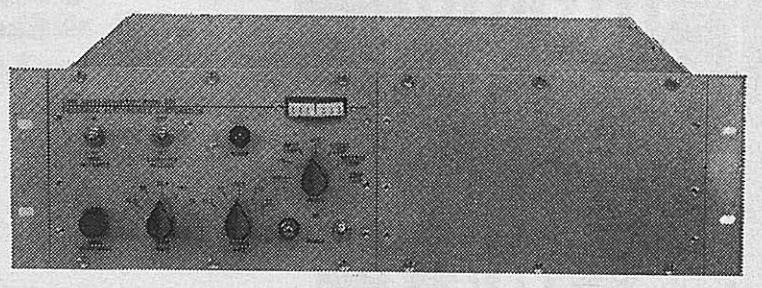
MODEL 352

Telegraph Regenerator
for restoration of distorted start-stop or synchronous telegraph signals



MODEL 651A

Code Speed Converter
provides interface between teletypewriter circuits operating at different baud rates

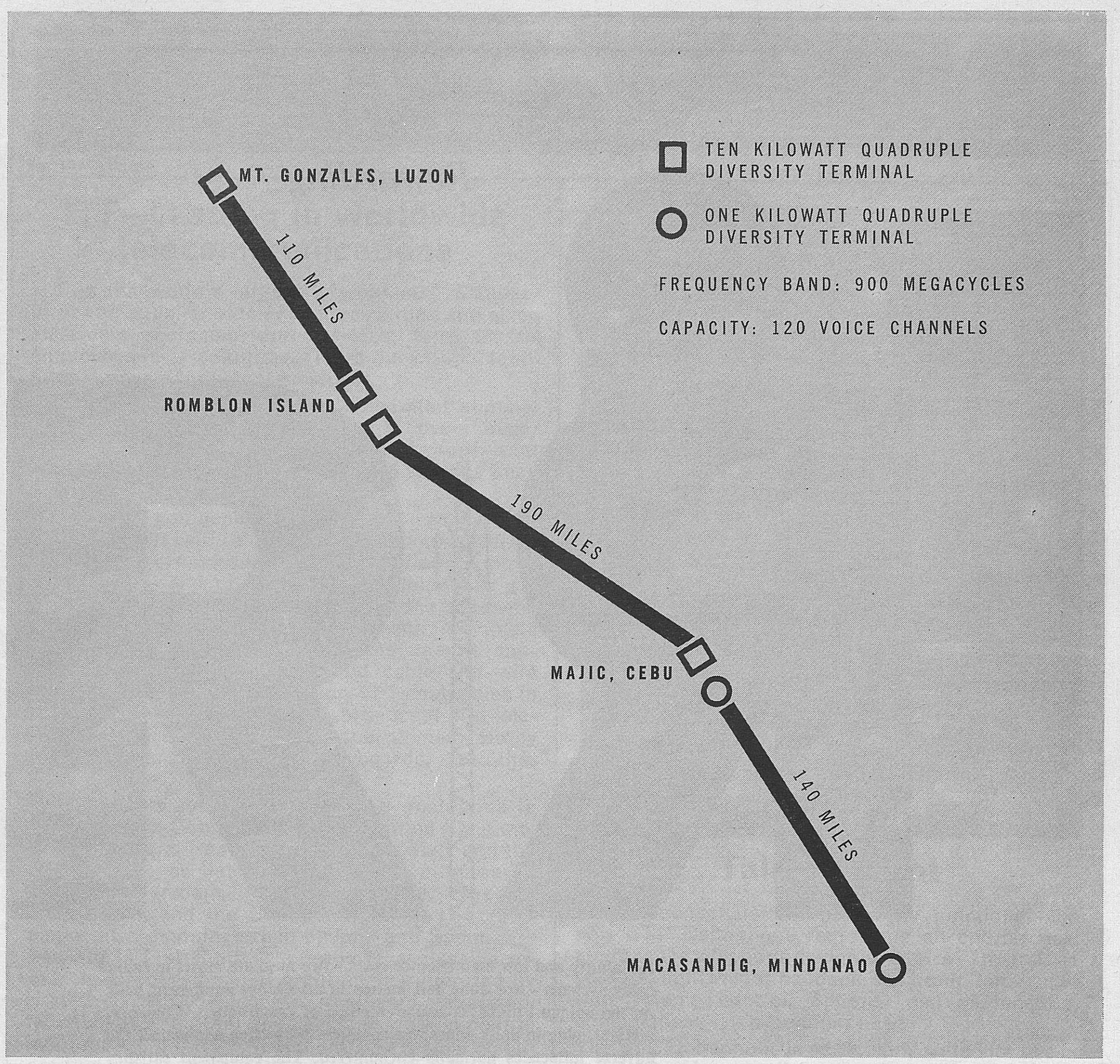


FEC

FREDERICK ELECTRONICS CORPORATION

International Division

750 Third Avenue, N.Y. 17, N.Y., U.S.A. Cable Address: ARTROCKE
Factory: Frederick, Maryland



Tropo...in the Philippines

The Republic of the Philippines joins the growing list of nations profitably utilizing REL tropo scatter radio relay equipment.

In the Philippines, a new three-span tropo scatter system provides commercial telephone and telegraph communications linking the Islands of Luzon, Romblon, Cebu, and Mindanao.

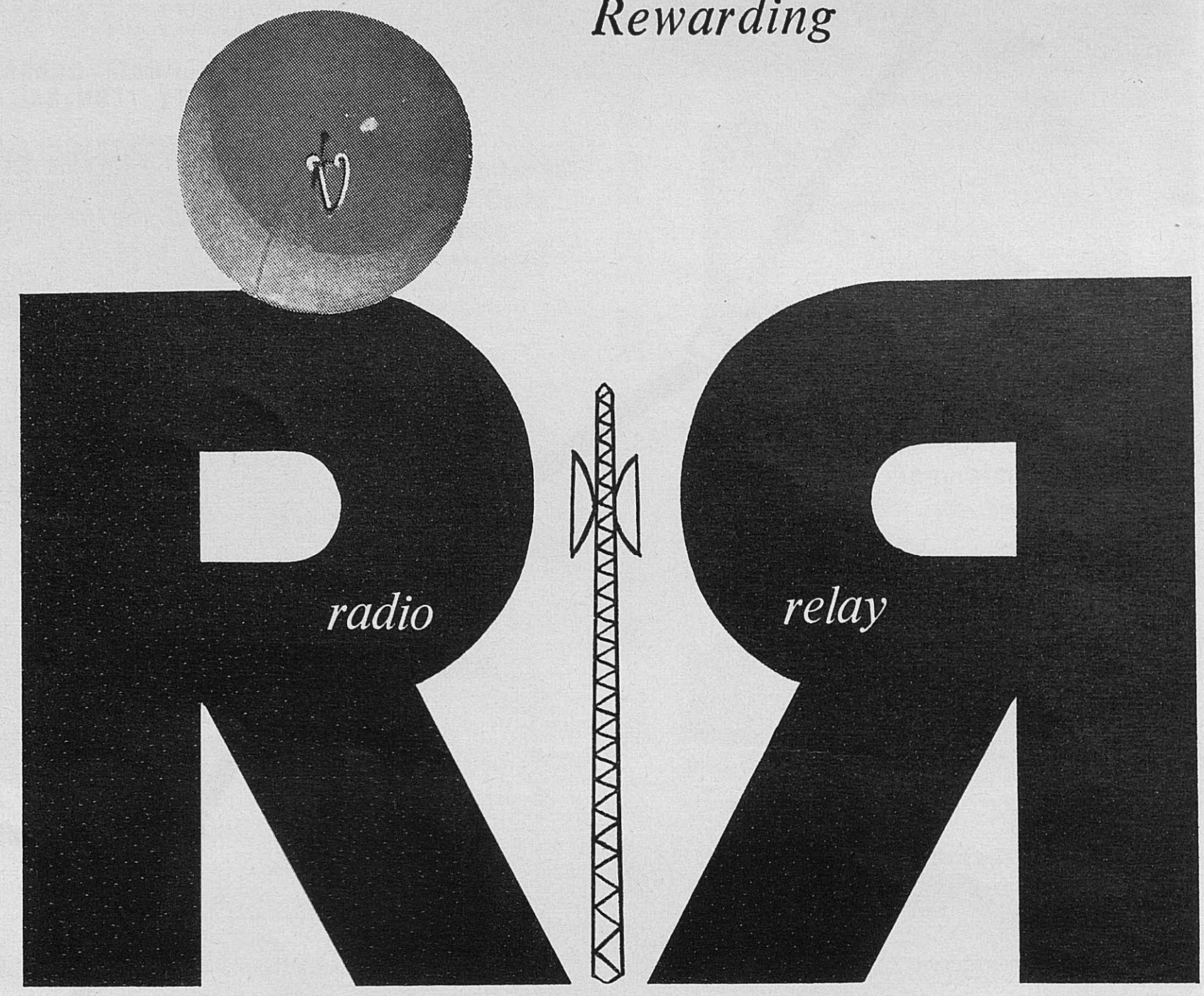
Operated by the Philippines Telephone Company, the system uses REL's internationally-proven 2500 Series equipment. This equipment is designed for an ultimate capacity of 252 voice channels, and meets or exceeds CCIR standards.

REL is the only company devoted principally to the design, development, and production of radio relay equipment for tropo scatter and microwave systems. Today, communications systems in over 20 nations are utilizing REL equipment.

Full technical details available on request.

RADIO ENGINEERING LABORATORIES
Division of Dynamics Corporation of America
Long Island City 1, New York

Reliable
Rewarding



Reliability and low maintenance costs - two absolute musts in radio relay systems - are done full justice in all Philips equipment built on the unique Philips 'conclave' method of construction. Compact, airtight, plug-in units guarantee complete protection against all the adverse influences normally encountered. The equipment satisfies the most stringent quality requirements over long periods of operation.

Our programme comprises equipment for:
24 telephone channels (400 Mc/s);
600-960 telephone channels or TV (4000 Mc/s);
24-60 telephone channels (7000 Mc/s);
60-120 telephone channels (7000 Mc/s);
broadband signals, e.g. radar and TV (7000 Mc/s).
Full documentation available on request. Write to Philips' Telecommunicatie Industrie - P.O. Box 32 - Hilversum - The Netherlands

PHILIPS

more than 40 years' experience in radiotransmission

1717 · E

an advertisement from Philips KEY CAPITALS series

ITT TELECOMMUNICATIONS REVIEW

No. 10 MAY 1965

ITT—Leading in worldwide telecommunications

ITT is the world's largest international manufacturer and supplier of telecommunications and allied electronic equipment and services. With 180,000 employees in 51 countries, ITT is the world's tenth largest private industrial employer.

ITT's position as the leading accredited supplier of telecommunication equipment to every major government in Europe was established shortly after the invention of the telephone in 1875 and has been maintained ever since.

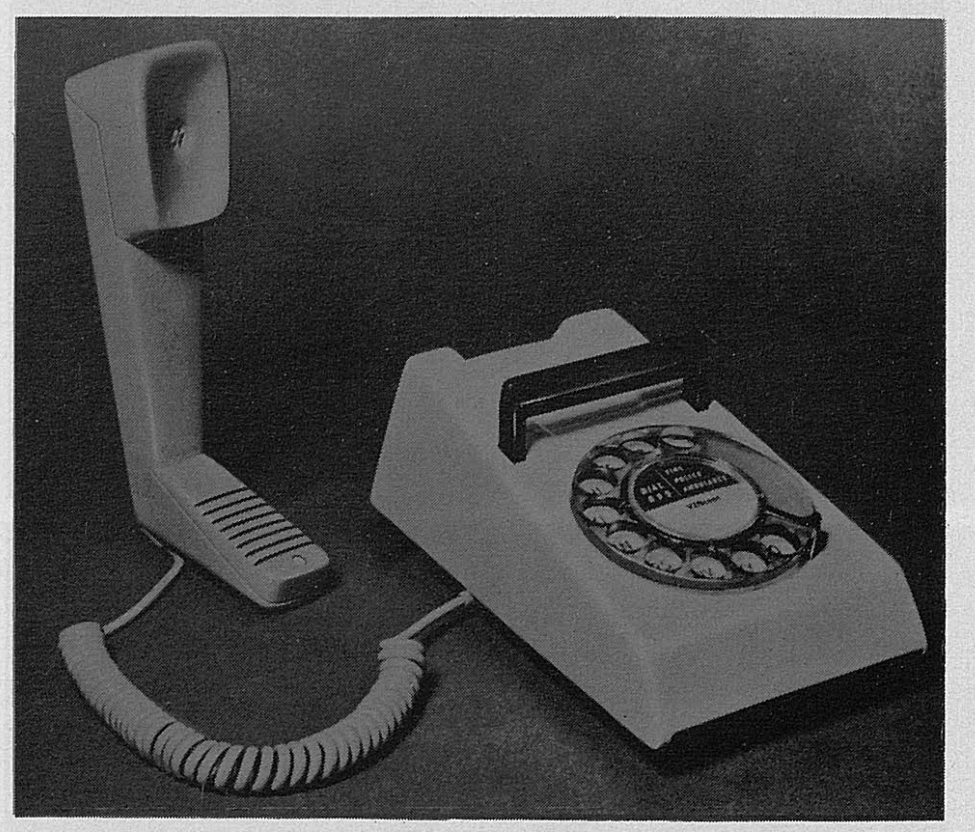
Today, ITT companies supply the European telephone market with a range of products covering every aspect of modern telecommunications. Among them: public and private automatic telephone exchanges, telegraph exchanges, telephone handsets, teleprinters, transmission equipment, complete submarine telephone cable systems, remote control and signalling systems, and cable and wire products of all kinds. In addition, ITT companies in Europe are major suppliers to broadcast and television administrations, international airlines, railway undertakings, power generating boards, and other public utilities.

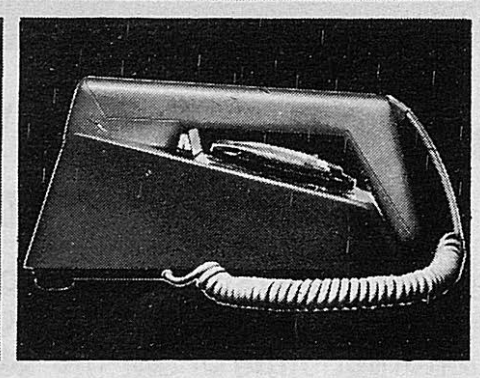
ITT conducts major manufacturing operations in five of the six Common Market countries (Belgium, France, Federal Republic of Germany, Italy and the Netherlands), as well as in each of the outer seven (Austria, Denmark, Norway, Portugal, Sweden, Switzerland, and the United Kingdom). ITT companies also manufacture in Finland and Spain.

Backing ITT strength in Europe is a massive research and development programme supported by a staff of 25,000 scientists, engineers, laboratory technicians and other specialists at work in central laboratories in the USA, England and France and in product-development laboratories at ITT factories throughout the world. A few of the products of ITT companies are listed and briefly described in this Telecommunications Review for the benefit of readers of the ITU Journal.

ITT World Headquarters,
320 Park Avenue, New York, N.Y., U.S.A.
ITT European Area Headquarters,
11 Boulevard de L'Empereur, Brussels 1, Belgium.

ITT





Talking point

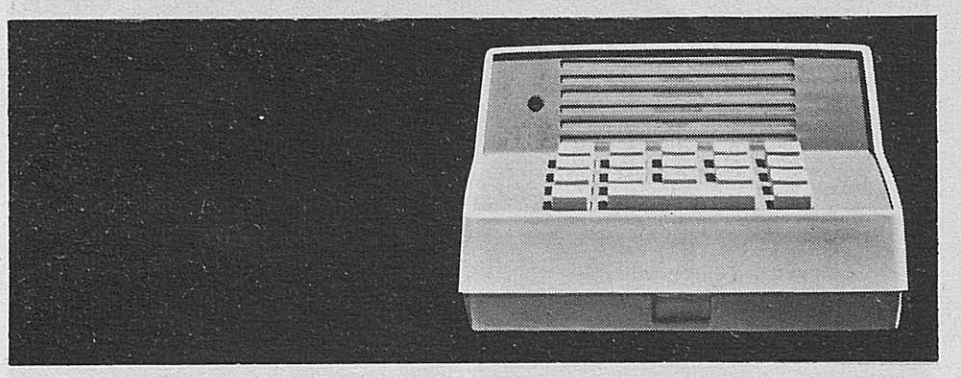
Design conscious but supremely functional—the new STC Deltaphone represents an entirely new approach to telephone design. A choice of restrained colours, lightweight handset, electronic tone caller with volume control, optional dial illumination, compactness . . . everything new!

The STC Deltaphone is particularly suited for use in homes, hotels, reception lounges and 'front offices', where harmony of design, functional elegance and prestige are essential. As well as its superb modern appearance, fit to grace any expensive service flat, the basic economies of space and effort give this new telephone utmost utility in offices and other business premises.

High technical specifications match the trend-setting symmetry of this truly new telephone.

Standard Telephones and Cables Limited,
Telephone Switching Division, Oakleigh Road,
New Southgate, London N.11, England.

STC

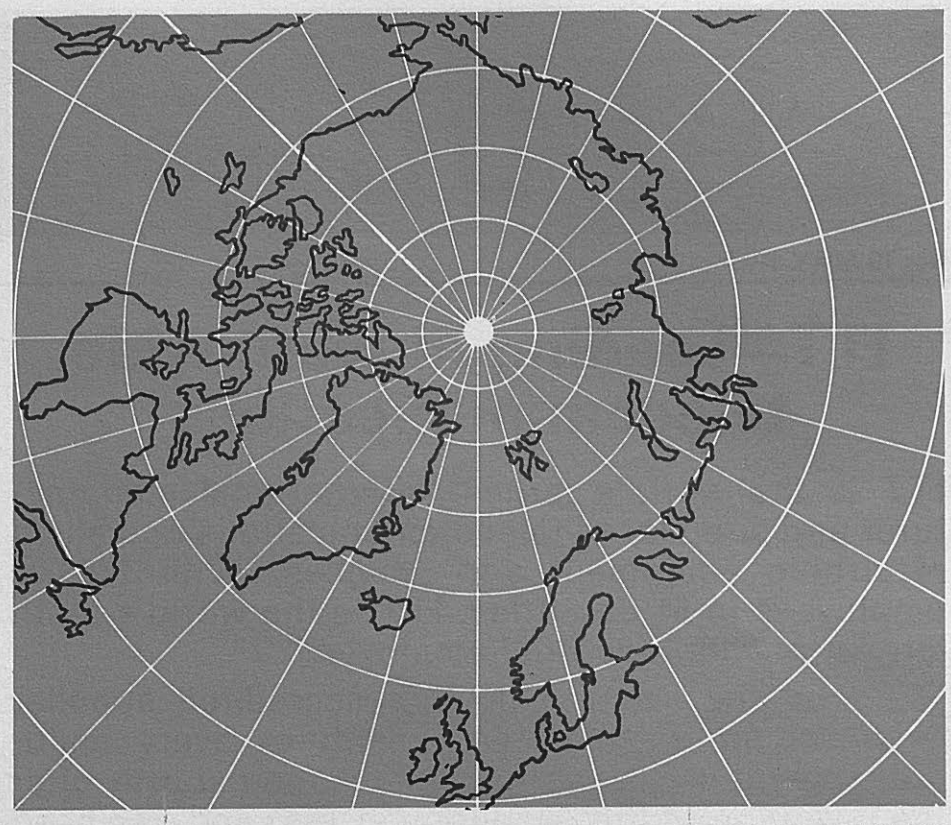


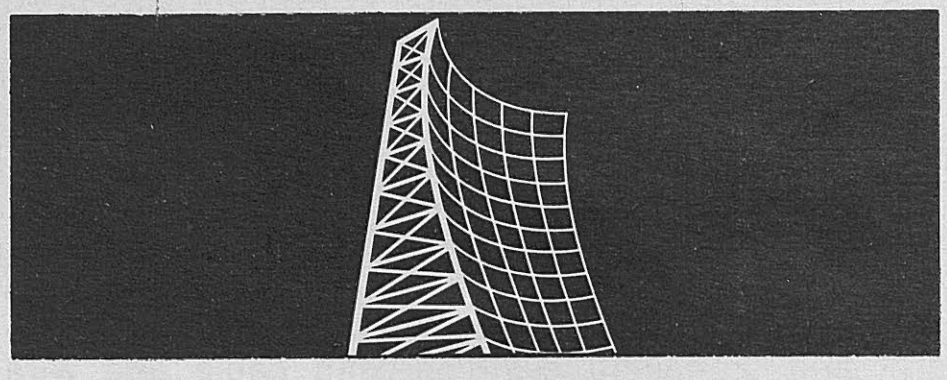
A word with you

. . . on executive intercom, the multi-purpose inter-office communications system. This executive intercom system helps you to wait for a number to become disengaged, to connect incoming calls to another line or to the staff location system. The exchange equipment of the executive intercom can be extended as required so that you never "out-grow" your inter-office telephone. This has obvious economic advantages—all you need initially is an installation to cover your present needs. The great variety of executive intercom subsets enables you to build your internal communications system to your own specification. Executive intercom is everyone's intercom.

Standard Radio & Telefon AB, Veddestavagen 9-11, Barkarby, Sweden.

Standard Radio & Telefon AB





Troposcatter

The S.910 Series radio equipment provides UHF communications systems for both troposcatter and line-of-sight operation. The construction is based upon the building block concept providing alternative configurations. The required operating frequency and channel capacity are obtained by inserting the appropriate modules. The system is designed to operate with standard pulse-code, pulse time or frequency division multiplex equipment. Video or other types of data can also be used.

- Frequency bands 1·7-8·5Gc/s
- 1-240 channels
- Up to quadruple diversity
- Parametric amplifier (optional)
- Phase-locked threshold extension (optional)
- Low power consumption
- Fully transistorized with exception of the output klystron.

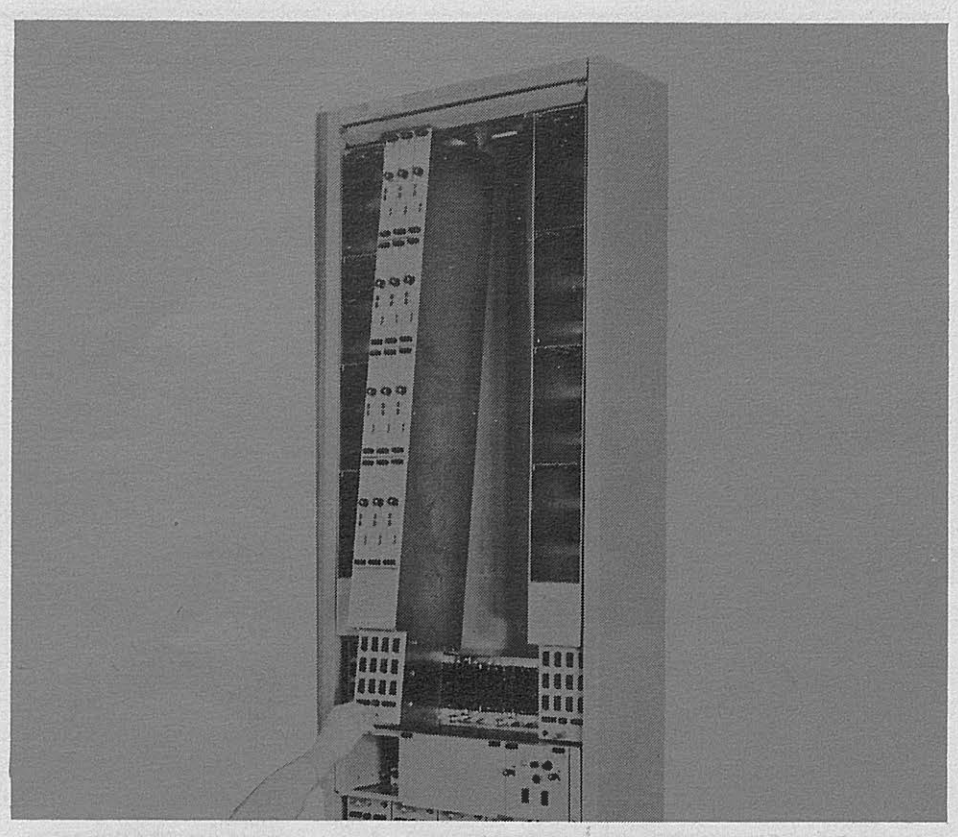
Standard Telephones and Cables Limited, Radio Division, Oakleigh Road, New Southgate, London, N.11. England.

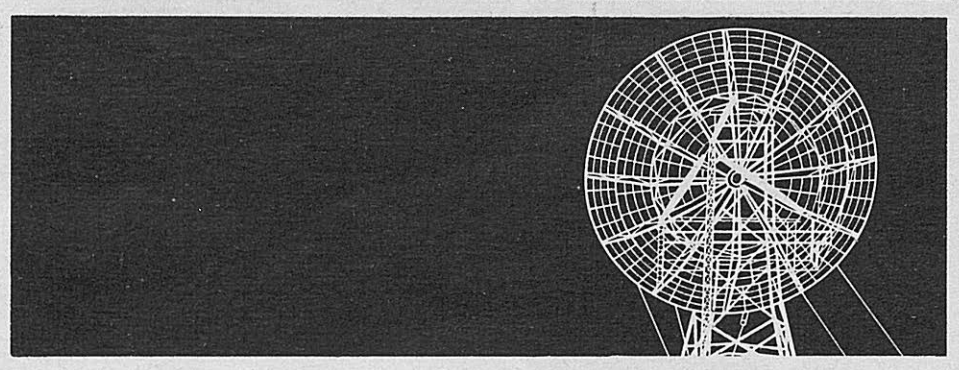
STC

ITT in Europe since 1879, employing more than 127,000 Europeans, 30 companies, 105 plants, manufacturing in virtually every country in Western Europe. Enquiries for products should be addressed to companies advertising.

INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION

ITT





Troposcatter in 2000 Mc/s band

Tropospheric Scatter may be the answer to your communications problem.

Where the building and maintaining of a complete run of repeater stations within line-of-sight may be impossible, impracticable or just plain uneconomical and yet where a need exists for 60 or even 120 telephone channels of international trunk grade, FACE Standard now offers the complete system required working in the 2000 Mc/s band comprising:

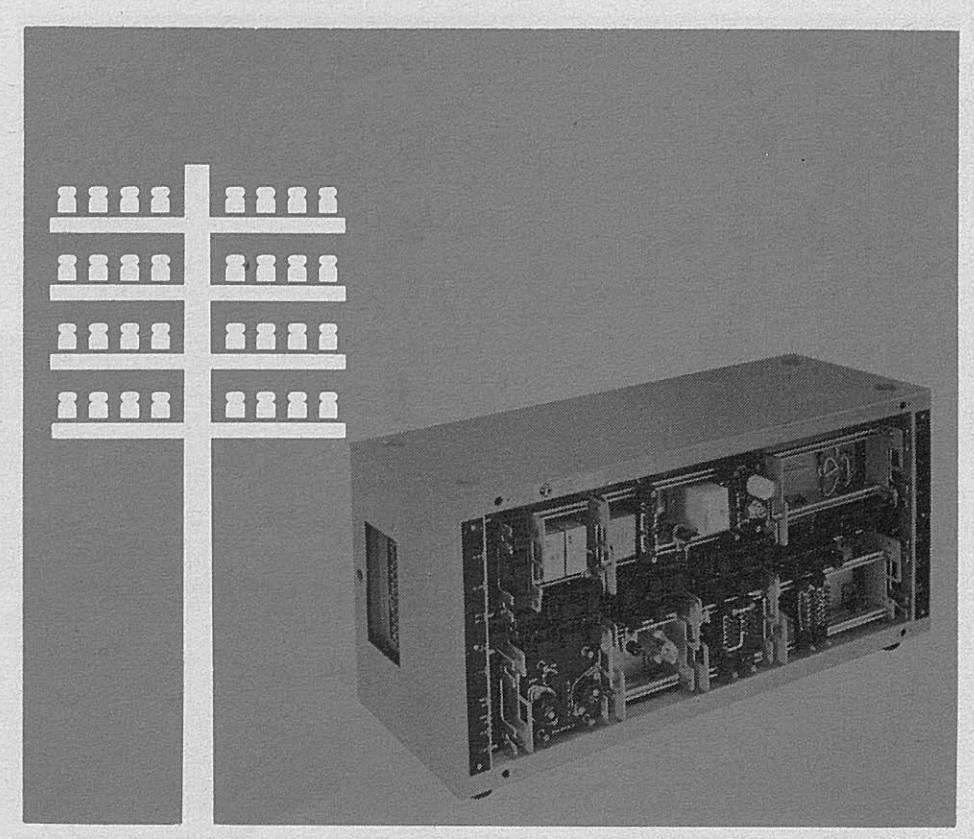
- Exciter, transmitter and 1 kW klystron power amplifier
- Receivers including parametric amplifiers and threshold extension where required
- Diversity combining
- High gain directional antennae.

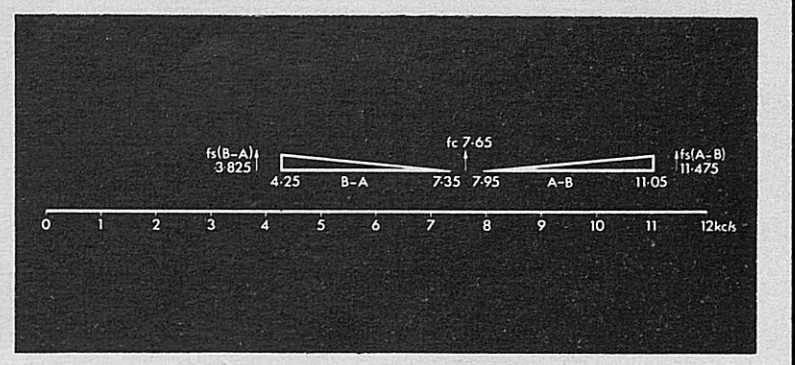
The photograph illustrates a typical diversity terminal mounted on five baysides.

Let us analyse your project for you in terms of this new and proven mode of communication.

Fabbrica Apparecchiature per Communicazioni Elettriche—Standard (FACE Standard), 39 Via Luigi Bodio, Milan, Italy.

Face Standard



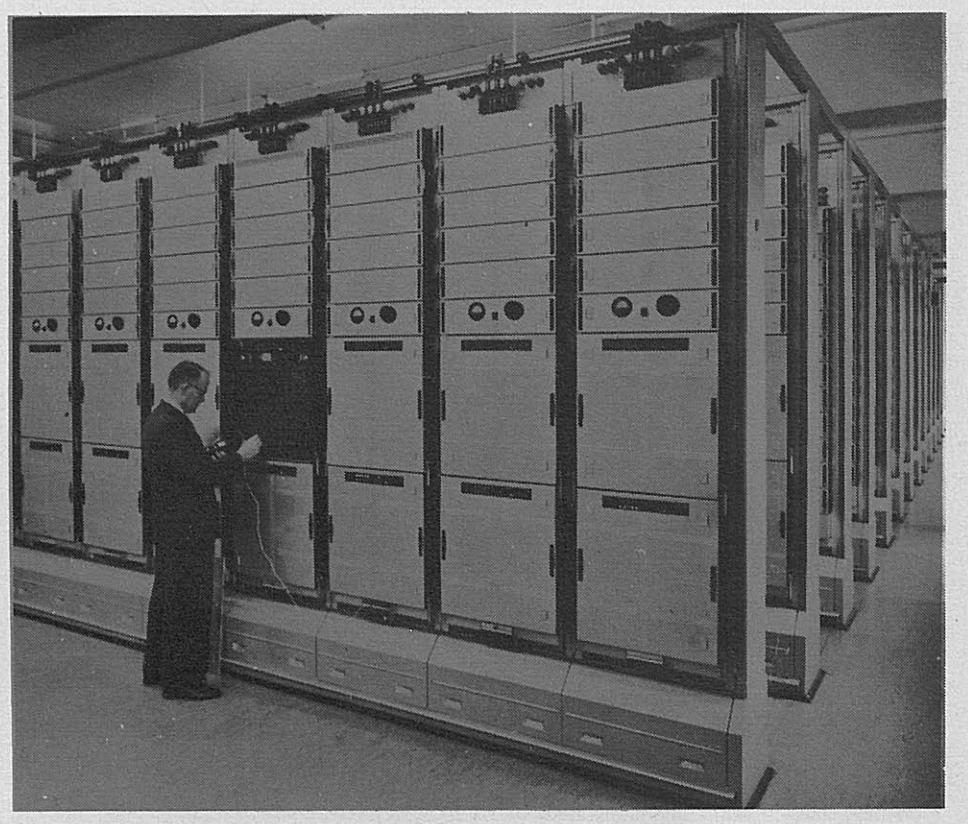


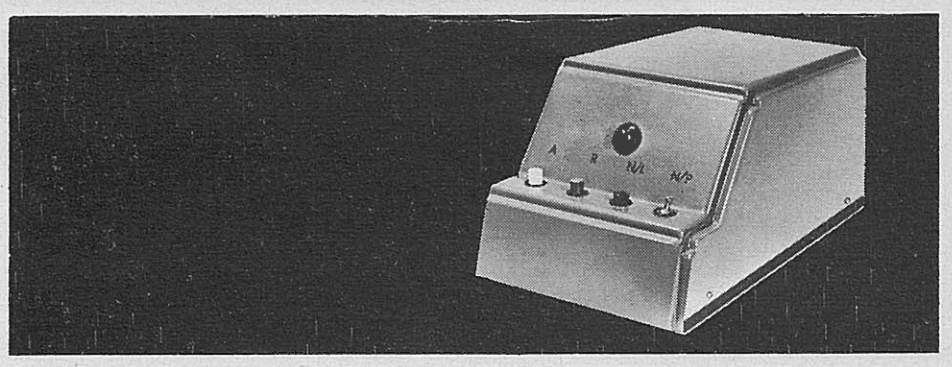
SO1-B single-circuit open-wire carrier telephone system

A short-haul system ideally suited to the provision of additional junctions to outlying minor exchanges. The equipment operates in the frequency band 3·825 kc/s to 11·475 kc/s, just above the normal audio channel and it utilizes one carrier frequency from which, after speech modulation, either the upper or lower sideband can be selected for transmission; the other sideband is used for reception. The SO1-B can be used as a speech plus duplex telegraph system and has out-of-band signalling. Transistors are used throughout the equipment which will operate from either a 24 or 50 volt d.c. supply; for mains operation, separate power units can be supplied. Equipment for one terminal is normally housed in a portable cabinet 21×10×10 inches (53×25·4×25·4 cm.) and weighs 50 lb (23 kg), but it can also be supplied for rack mounting.

Further details can be obtained from Standard Telephones and Cables Limited,
Transmission Systems Group,
Basildon, Essex, England.

STC





Universal telex

The person-to-person contact of telephony . . . the recording facilities of telegraphy—you get the best of both worlds with universal telex. And if you're looking for the best in telex equipment, look no further than Bell.

Bell universal teleprinter switching systems (register controlled—rotary and crossbar) make use of the most up-to-date electronic techniques and cover a complete range of operational and technical requirements. Bell Universal Telex give you reliability, flexibility and economy; smooth conversion from semi-automatic to fully automatic service; arbitrary connection of local or long distance subscribers; single current loop or double current operation; routing of traffic through landline, cables or radio links provided with automatic error correcting devices; interworking with all existing switching systems; various transmission speeds; the use of multimetering or recorded call charging on perforated tape. And with Bell Universal Telex there's no call cancellation during traffic peaks. Bell gives you all these advantages and complies fully with CCITT recommendations.

Bell's 83 years' experience in telecommunications is yours with Bell Universal Telex.

Bell Telephone Manufacturing Company,
Telex Switching Division,
Francis Wellesplein, 1 Antwerp, Belgium.

Bell Telephone Mfg Co

Lightweights ahead!

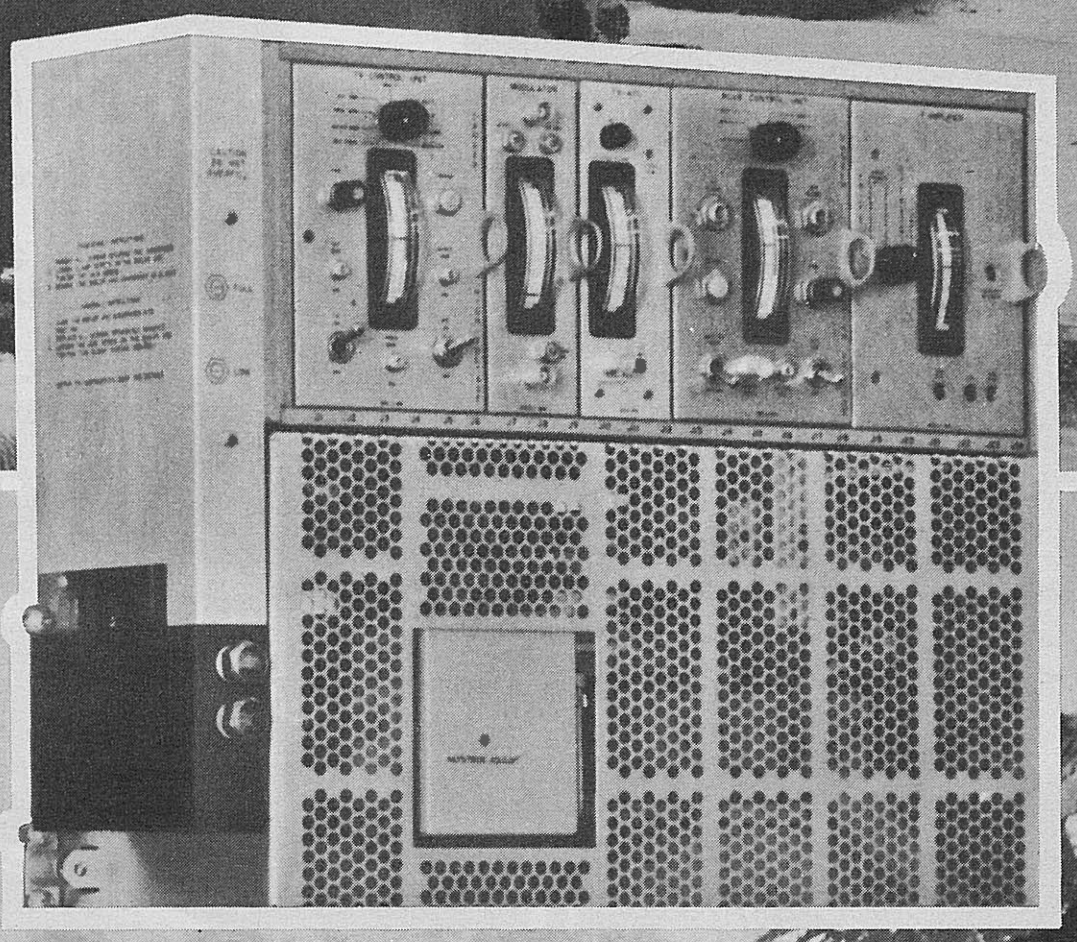
STC lightweight headsets are designed for use by private and public telephone operators. These are fast superseding the use of the older breast-type instruments. Main advantages are:

Extraordinary light weight, high degree of comfort, stability and manoeuvrability and constant level of transmission regardless of head movement. Made of nylon plastic, and virtually unbreakable, the headsets are available in black and grey (colours approved by the British Post Office) and also in ivory.

The "Rocking Armature" principle—an important STC development in telephone receiver design—which gives improved sensitivity and frequency response has been incorporated into these instruments.

Standard Telephones and Cables Limited,
Telephone Switching Division,
Oakleigh Road, New Southgate,
London, N.11, England.

STC



.002% Stability over wide temperature ranges

Whether it's desert heat or mountain cold, this is the kind of improved long-term transmitter frequency stability you now get with Collins MW-108C Microwave Systems. The reason? A crystal referenced afc system and a unique klystron temperature stabilizing device called an *ebullator*.

These combine with an advanced klystron linearizer and improved phase equilization of receivers to provide better, long-term performance.

Interested? Call Collins today.

COLLINS RADIO COMPANY, Europe, Middle East and Africa Headquarters, Heathrow House, Bath Road, Cranford, Hounslow, Middlesex, England.

COLLINS

terminaux télégraphiques

TÉLÉIMPRIMEURS ÉLECTRONIQUES • TÉLÉIMPRI
ELECTRONIC TELEPRINTERS • ELECTRONIC TEL
TELEIMPRESORES ELECTRONICOS • TELEIMPRES
ÉLECTRONIQUES • TÉLÉIMPRIMEURS ÉLECTRONI
TELEPRINTERS • ELECTRONIC TELEPRINTERS • E
ELECTRONICOS • TELEIMPRESORES ELECTRONIC
TÉLÉIMPRIMEURS ÉLECTRONIQUES • TÉLÉIMPRI
ELECTRONIC TELEPRINTERS • ELECTRONIC TEL
TELEIMPRESORES ELECTRONICOS
ÉLECTRONIQUES • TÉLÉIMP
TELEPRINTERS •
ELECTR

SAGEM

SOCIÉTÉ D'APPLICATIONS GÉNÉRALES
D'ÉLECTRICITÉ ET DE MÉCANIQUE

S.A. Cap. 24 000 000 F - 6, Av. d'IÉNA, PARIS 16e
Tél. 553-62-50 - Câbles Télésagem Paris - Telex : 20815

"2 B" PUBLICITÉ - PARIS T-21

FROM BRITAIN'S LARGEST ELECTRICAL GROUP...

THE NEATEST, MOST PROFITABLE PACKAGE IN THE TELEPHONE BUSINESS!!!!!!!!!

The A.E.I., C.A.T.T. system has been specially developed to meet the needs of the North American Continent-wide Direct Distance Dialling Scheme. In conjunction with our A.N.I. system, which determines the calling subscriber's number and class of service for accounting purposes, it provides the necessary computer/business – machinery – legible record of long distance calls. This twin high-grade A.E.I. package takes up less space, is fully flexible, can be applied to all existing telephone systems and complies with all specified requirements of D.D.D. It can be supplied as a complete unit or two separate systems. Prices are competitive – in fact, A.N.I. costs less than any comparable equipment available today.

C.A.T.T.

CENTRALISED AUTOMATIC TOLL TICKETING

- Handles all D.D.D. routing functions and it will work with existing Register/Translator equipment where operator or toll dialling facilities already exist.
- D.C. or M.F. outpulsing to suit local conditions and to give remote operation by C.S.P. routing machine where required.
- Checking Person to Person, collect calls, etc. by routing to a manual operator with automatic sending under the operator's control if required. Alternative routing with foreign area translation. Code Conversion and up to three exit digits to accommodate local area trunking problems.
- Full Sender/Tabulator/Translator Common Control giving maximum equipment economy and security.
- Suitable for application to all types of national, regional and local Toll Switching centres.
- Employs the service proven A.E.I. High Speed Motor Uniselector for all talking and coupling functions.

C.A.T.T. equipment is currently being manufactured for the Alberta Government Telephones for the important Edmonton Class 3 Primary Centre, and Saskatchewan Government Telephones for the Swift Current Toll Centre.

A.N.I.

AUTOMATIC NUMBER IDENTIFICATION

- D.C. Working giving an inexpensive system which does not interfere with the operation of the telephone exchange, works at high speed and is immune from misoperation by outside agencies.
- Absolute reliability based on the use of proven telephone components backed by 100 years of design experience and embodying self checking and fault printout facilities.
- D.C. loop outpulsing or Multi-Frequency High Speed (MF) outpulsing to suit all destination signalling conditions, individual sets of transistor oscillators being supplied in each A.N.I. Register.
- No special power or tone supplies required.
- Complete compatibility with most types of telephone exchange equipment and all types of Automatic Machine Accounting equipment.
- Unlimited Class Marks without restriction of the basic A.N.I. facility.

A.N.I. equipment is already being supplied to Canada to the tune of half a million lines.

AEI COMMUNICATIONS

For full technical details, please contact:

ASSOCIATED ELECTRICAL INDUSTRIES LIMITED
TELECOMMUNICATIONS DIVISION, WOOLWICH, LONDON SE18

SIEMENS

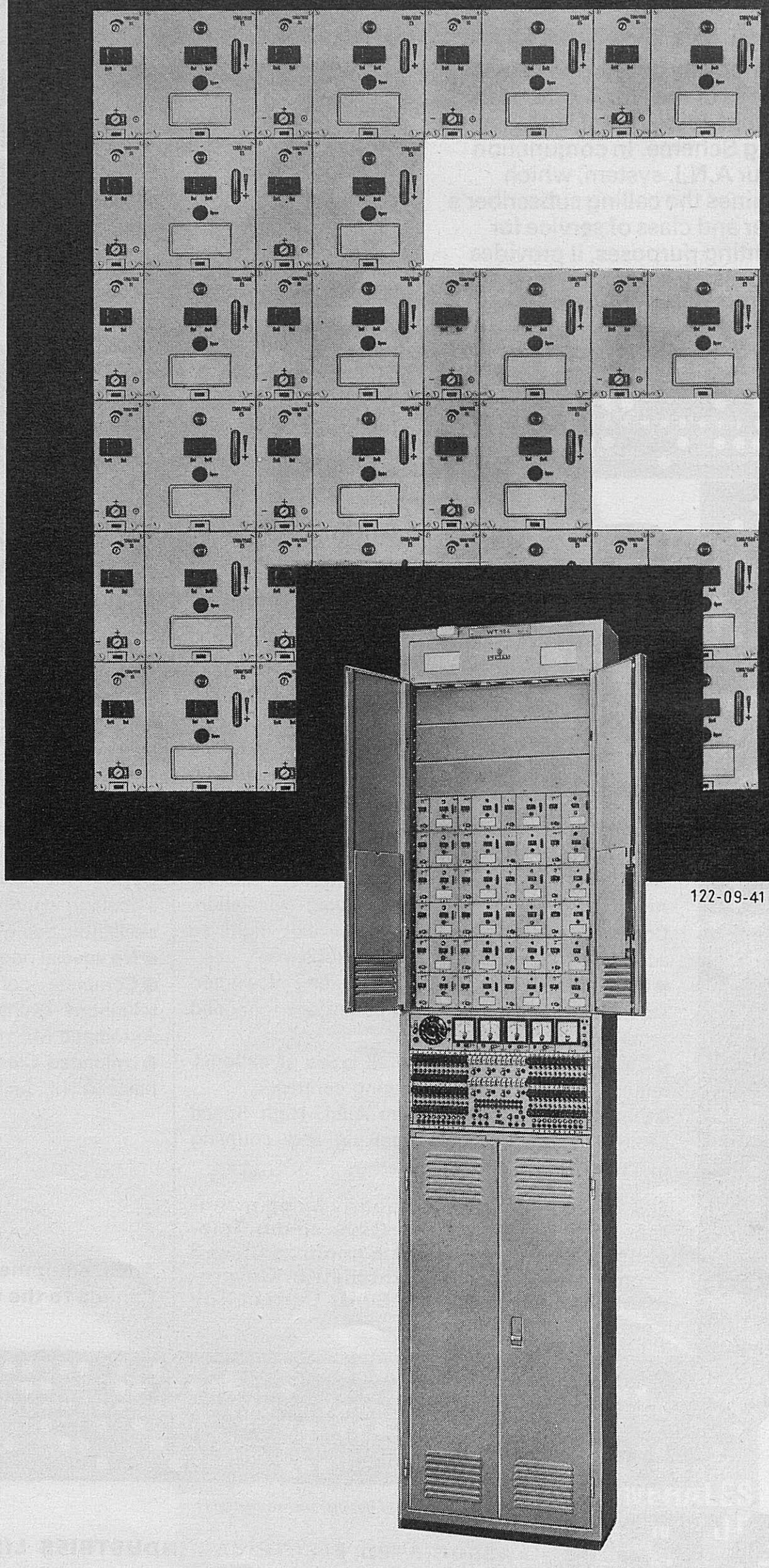
WT 100

VF telegraph transmission systems for universal application

WT 100 is the collective term for a group of VF telegraph systems which differ with respect to their type of modulation and frequency allocation. They satisfy all operational conditions for the various types of transmission paths, such as carrier circuits, cables, radio links and open-wire lines.

Space requirements are reduced to a minimum by the use of the well-tried plug-type unit method in conjunction with transistorization.

Suitable cabinets and cases are available for all types of operational requirements. Their wiring leaves full freedom in the selection of channel units, even of units providing for different types of modulation and bandwidth.



122-09-41

WT 100 systems:

AM 120 system with amplitude modulation,
24 channels in speech band,
Telegraph speed 50 bauds

FM 120 system with frequency modulation,
24 channels in speech band,
Telegraph speed 50 bauds

FM 170 system with frequency modulation,
18 channels in speech band,
Telegraph speed 75 bauds

FM 240 system with frequency modulation,
12 channels in speech band and a
further 16 channels in mid-band range,
Telegraph speed 100 bauds

FM 480 system with frequency modulation,
6 channels in speech band,
Telegraph speed 200 bauds

In special cases higher telegraph speeds are tolerable.

SIEMENS & HALSKE AKTIENGESELLSCHAFT
WERNERWERK FÜR TELEGRAFEN- UND SIGNALTECHNIK · MÜNCHEN

Journal télégraphique (1869-1933)
57 volumes published

Telecommunication Journal (since 1934)
Volume 32

Published on the 15th of each month by the International Telecommunication Union (ITU) in separate English, French and Spanish editions

Volume 32 - No. 5 - 15 May 1965

SUBSCRIPTION RATE: For all countries: Edition in three separate languages: English, French, Spanish. 20 Swiss francs yearly for one language edition, 30 francs yearly for two and 40 francs yearly for three separate language editions. Single copy 2 francs. For all information please apply to the Editorial Office:
Place des Nations,
1211 GENEVA 20 (Switzerland)
Telephone (022) 34 70 00 - 34 80 00
and
Telegraphic address: BURINTERNA
Postal-cheque account: Geneva 12-50
Bank account: Société de Banque Suisse, Geneva.

ADVERTISING:
Annonces-Service Post S.A.
Wydäckerring 140, 8047 Zurich.
(Telegraphic address:
ANNONCENSERVICE ZURICH)
Postal-cheque account: Zurich 80-8071.
Bank account: Union Bank of Switzerland, Zurich.

NOTICE — Opinions expressed in the articles appearing in the *Telecommunication Journal* are the author's personal opinions and do not necessarily reflect those of the Union.

Material from this publication may be reproduced in full or in part, provided that the reprinted text is accompanied by the following acknowledgement: *(ITU Journal)*.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the ITU in preference to others of a similar nature that are not mentioned.

telecommunication journal

Page

Editorial 178

International Telegraph Conference, Paris 1865 180

News 185

Centenary satellites 192

Telecommunications yesterday, to-day and to-morrow:

5 — Satellite communications of the future

LEONARD JAFFE 194

From semaphore to satellite — V 197

Telepersonality No. 53

Jacques Marette 203

A further contribution to the discussion on the structure of the ITU

Dr. W. J. FIJAŁKOWSKI 204

The Journal 75 years ago 213

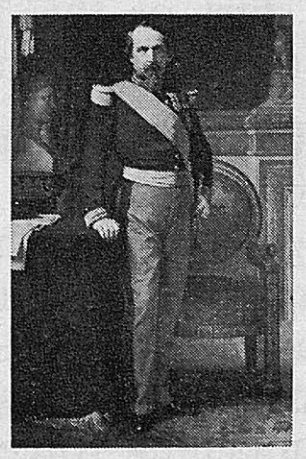
Review review 216

Books 217

Solar indices for ionospheric propagation 219

Official announcements 220

List of recent and forthcoming publications of the ITU . . 221



In celebration of the Centenary month, the Journal *is presenting its first cover in colour—a reproduction of Flandrin's painting of Emperor Napoleon III which is part of the* Collection du Musée de Versailles.

(The colour photo is by AGRACI, Paris)

Illustration credits:

Pages 182, 183 and 184 — Archives of the ITU; 192 — Pravda, *25 April 1965; 193 — Communications Satellite Corporation, Washington; 195 — Photopress, Geneva; 196 — NASA; 197 — Marconi Company Limited, Chelmsford; 198 (*upper*) — Deutsches Museum, Munich; (*lower*) A. R. Michaelis collection, London; 200 — Marconi Company Limited, Chelmsford; 201 —* The Sphere, *1912; 203 — Agence universelle de presse, Paris; 204 — ITU.*

editorial

THE CENTENARY

Collective action of almost any kind arises from necessity or idealism. Necessity is the more easily identifiable cause—family, trade and nations all have clearly traceable origins in such mundane imperatives as food, shelter and security. But the power of ideals to generate common enterprise can be seen in the spread of the great religious movements, in some political creeds and in the belief that it is idealism which is responsible for the international community's dogged steps in modern times towards its own self-realization.

It is not surprising that faith in a truly international—inter-national—ordering of world affairs should have been so long regarded as idealistic. Writers on international law from Grotius onwards have been largely concerned with limitations on warfare, and, since those who wage war are bound to regard their operations in the light of necessity, the spokesmen of less belligerent alternatives have been easily depicted, and equally often decried, as idealists.

It is one of the achievements of the last hundred years—these hundred years which we now celebrate—that multilateral international co-operation should have begun to be looked on as a necessity.

The start of this process has been described by Professor J. L. Brierly in his famous book *The Law of Nations:*

> " The administrative function, like the executive, is not provided in the international system with any centralized organ, but in the latter half of the nineteenth century a number of separate institutions with specialized administrative functions were created. They arose not from any idealistic theory of international relations, but from the compelling force of circumstances; in one department of administration after another experience showed that government could not be even reasonably efficient if it continued to be organized on a purely national basis. The first such institutions were the International Telegraphic Union formed in 1865 and the Universal Postal Union formed in 1874, and there are now many others. "

This development has been described by Mr. F. P. Walters in his *History of the League of Nations* as " practical internationalism ":

> " Practical internationalism was a natural consequence of the vast material developments of the nineteenth century. Extraordinary increases in population, the revolutionary effects of the steamship, the railway and the telegraph, the enormous extension of external trade and internal wealth—these and other changes multiplied many times over the fields of contact between nations and between governments. It was slowly realized that if every government continued to follow its own convenience without consulting that of its neighbours, the result could only be loss and inconvenience for all...Accordingly, a number of international organs were established and invested with varying powers of control over the individual national administrations. "

What has become increasingly clear in recent years is that " practical internationalism " can no longer be so neatly bracketed off, as if it were just one aspect of international co-operation. The contrast previously drawn by Professor Brierly between an " idealistic theory of international relations " and " the compelling force of circumstances " grows ever less sharp. The areas in which, in his words, " government could not even be reasonably efficient if it continued to be organized on a purely national basis " inexorably extend. While the choice arrestingly posed by the poet Auden in the pre-nuclear dawn that " we must love one another or die " remains an unreal one (for we invariably die), nations seem to be deciding, to an extent inconceivable more than a hundred years ago, that they have no choice but to work together.

Thus necessity as a stimulus to international co-operation has grown to the extent where it is barely distinguishable any longer from idealism. International co-operation itself, despite temporary difficulties and setbacks, is incontestably the stronger as a result.

In this context the ITU Centenary takes on a significance which goes beyond the Union itself. One hundred years ago, responding to a particular necessity, states began to organize in their common interest. There was thereby created an element vital to the future of international co-operation in all its forms, for, while later and larger enterprises such as the League of Nations or even the United Nations itself may have initially owed more to idealism than necessity, it is in the fusion of both, as we have seen, that international co-operation finds its strength. And it was the foundation of the ITU in 1865 that first demonstrated the necessity.

Fundamentally, it is this unique contribution to modern history that we are celebrating.

COLIN MACKENZIE

INTERNATIONAL TELEGRAPH CONFERENCE PARIS, 1865

Signature of Convention by twenty sovereign States opens era of international co-operation

The International Telegraph Conference convened in Paris held its first meeting on 1 March 1865 in the Building of the Ministry of Foreign Affairs.

On the proposal of H.E. Prince Metternich (Austria), the chairmanship was conferred on H.E. Mr. Drouyn de Lhuys (French Minister of Foreign Affairs) who, after opening the meeting, outlined the purpose of the Conference.

He recalled first of all that the exchange of telegraphic correspondence between European States had been governed by two Conventions agreed in 1858 at Brussels and at Berne respectively, to which Powers which had not been contracting parties to the two international Acts, had subsequently adhered. Since then, France had taken advantage of the authority conferred by the last paragraph of Article 2 of the Berne Convention to conclude several new arrangements to reduce the charges for telegrams and to replace the area system by a single tariff rate. Nevertheless, the advance in science, the extension of lines and the multiplicity of telegraph communications had clearly revealed that the provisions of the Brussels and Berne Conventions no longer satisfied the needs and conditions imposed by the current situation. Wishing to put the lessons learned through experience to good use as soon as possible and recognizing the advantages to be derived in its international relations from a uniform telegraph arrangement, France had felt bound to propose, not only to the States signatories of the Conventions, but likewise to all European Powers, that a Conference be convened for the negotiation of a general Treaty. England alone had not been summoned; it was well known that the telegraph services in that country were in the hands of private companies; they would in any event, doubtless align their system with that accepted in the Act, the clauses of which it was the task of the Conference to determine.

The other countries approached had reacted favourably. That agreement was gratifying since it foreshadowed a happy issue for the negotiations.

It was true that Russia had made a reservation; that country had agreed to take part in the Conference only on condition that a departure would be made in its specific case from the absolute principle for the establishment of a uniform tariff: the enormous area of that Empire with its scattered population made it impossible to adopt a single rate. It had been felt that that request could equitably be granted—and the Conference would no doubt share that view—all the more so, since a similar exception had already been made in the case of Prussia, because of its geographical configuration, in the private treaty concluded between that State and France in January that year; in that treaty, arrangements had been made for two different sets of tariffs: one for the provinces stretching up to the Weser and one for those beyond that river.

It should further be recalled that, with those two exceptions, the basis of the current negotiations consisted in the substitution of a single tariff

THE PARTICIPANTS AT THE MEETINGS

For Austria: H. E. Prince von Metternich-Winneburg, assisted by Mr. Brunner von Wattenwyl
For the Grand Duchy of Baden: Baron von Schweizer
For Bavaria: Baron von Wendland, assisted by Mr. von Weber and Mr. van Dyck
For Belgium: Baron Beyens, assisted by Mr. Fassiaux and Mr. Julien Vinchent
For Denmark: Count von Moltke-Hvitfeldt, assisted by Mr. Faber
For France: H. E. Mr. Drouyn de Lhuys, assisted by Mr. Herbet, Viscount de Vougy and Mr. Jagerschmidt
For Greece: Mr. Phocion Roque, assisted by Mr. Manos
For Hamburg: Mr. Heeren
For Hanover: Baron von Linsingen
For Italy: Cavaliere Nigra, assisted by Cavaliere di Minotto
For the Netherlands: Mr. Lightenvelt, assisted by Mr. Staring
For Portugal: Viscount de Païva, assisted by Mr. Damasio
For Prussia: H. E. Count von Goltz, assisted by Mr. de Chauvin
For Russia: H. E. Baron von Budberg, assisted by Mr. von Guerhard
For Saxony: Baron von Seebach
For Spain: H. E. Mr. A. Mon
For Sweden and Norway: Baron Adelswärd, assisted by Mr. Brändström and Mr. Nielsen
For Switzerland: Mr. Kern, assisted by Mr. Curchod
For Turkey: H. E. Djemil-Pasha
For Wurtemberg: Baron von Waechter

A general view of Paris at the period

for the existing system of payment by areas, so as to simplify as far as possible the use of telegraph communications. A rough draft of a Convention, prepared by the French Administration, had been submitted to each Member of the Conference; among the improvements suggested were those relating to the option of drafting telegrams in any of the languages used in the territories of the contracting States, the possibility of using cypher, the *registered* system whereby the accurate transmission of a telegram was assured, and many others. But the manifold questions entailed in the rearrangement to be made required detailed consideration as well as technical knowledge; it was to pave the way for a solution to those problems that the various Governments had designated special delegates to attend the Conference in Paris. He would consequently propose that a Committee established, with delegates as members, for the purpose of preparing a draft General Treaty for submission to the Conference. In that connection, he would note that the document drawn up by the General Administration of the Telegraph Lines of France was no more than a preliminary draft, intended to provide material for inmediate discussion in the Committee, and therefore open to any amendements which might arise out of its debate.

The Members of the Conference unanimously approved the establishment of the Committee and, on the proposal of H.E. the Ambassador of Austria, the Director-General of the Telegraph Lines of France, the Viscount de Vougy, was asked to act as Chairman.

H. E. Djemil-Pasha (Turkey) stated that the Ottoman Government supported in principle the views of the French Government, but only as far as the telegraph lines of European Turkey were concerned; he would have to make a reservation in regard to Asiatic Turkey because of the specific circumstances prevailing in that region.

H. E. Mr. Drouyn de Lhuys officially acknowledged the statement made by the Ambassador of Turkey. The reservations were unlikely to give rise to objection.

One vote per country

Mr. Kern (Switzerland) observed that, in the Committee just set up, the various States would be unequally represented; some had sent two delegates, while others had sent only one. To rectify that lack of balance, he would suggest that each country was accorded one vote only, irrespective of the number of delegates it had sent.

The proposal was approved.

H. E. Mr. A. Mon (Spain) announced that the Spanish delegation would be arriving shortly.

Baron von Waechter (Wurtemberg) made a similar announcement concerning the Wurtemberg delegation.

H. E. Djemil-Pasha announced that the Turkish delegate had left Constantinople and would shortly arrive in Paris.

After receiving those various items of information, Mr. Drouyn de Lhuys observed that the Conference had reached two decisions: first, it had asked a Committee, comprising all delegates and presided by Viscount de Vougy, to prepare and submit to him a Draft General Treaty; second, it had ruled that, whenever a vote was taken, each State should be entitled to one vote only.

His Excellency added that it was for Viscount de Vougy to convene the members of the Committee of which he was Chairman. In setting the date of the meeting, allowance should be made for the fact that all States were not yet represented in Paris.

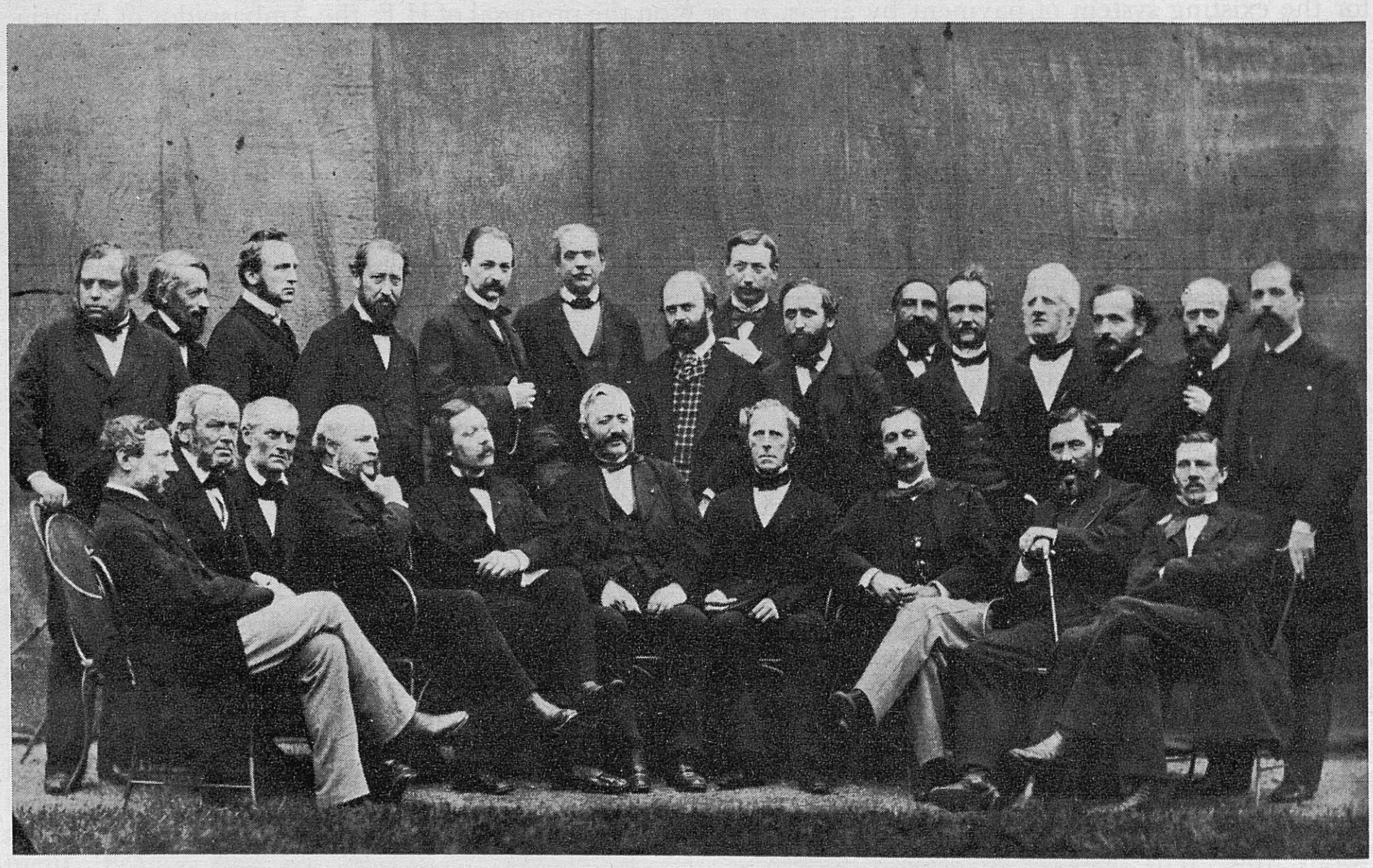
As there were no comments, the Conference adjourned until the work of the Committee was ready for consideration.

SECOND MEETING

The International Telegraph Conference met for the second time in the Building of the Ministry of Foreign Affairs on Thursday, 13 April 1865, under the Chairmanship of H. E. Mr. Drouyn de Lhuys.

H. E. the Foreign Minister opened the meeting and recalled that the Conference had set up a Committee, composed of the delegates and presided by Viscount de Vougy, Director-General of the Telegraph Lines of France, to draw up a draft Convention. His Excellency recalled also that, to facilitate the work of the Conference, the French Administration had prepared a preliminary draft to serve as a basis for discussion. Delegates had held sixteen meetings to consider that document. After amendment and amplification of several sections, it had been adopted as a whole and constituted the final draft which was submitted for approval by the Conference.

The draft, added Mr. Drouyn de Lhuys, would introduce many important improvements in the international telegraph service. The provisions prepared by the delegates would be read out; some of them were particularly noteworthy. First of all there was the provision whereby, in each State, a standard charge system would replace the system of charging by area — a principle which was favoured by Russia, for all its possessions in Europe with the exception of the Caucasus, and by Prussia for its provinces on both sides of the



The delegates at the 1865 Conference

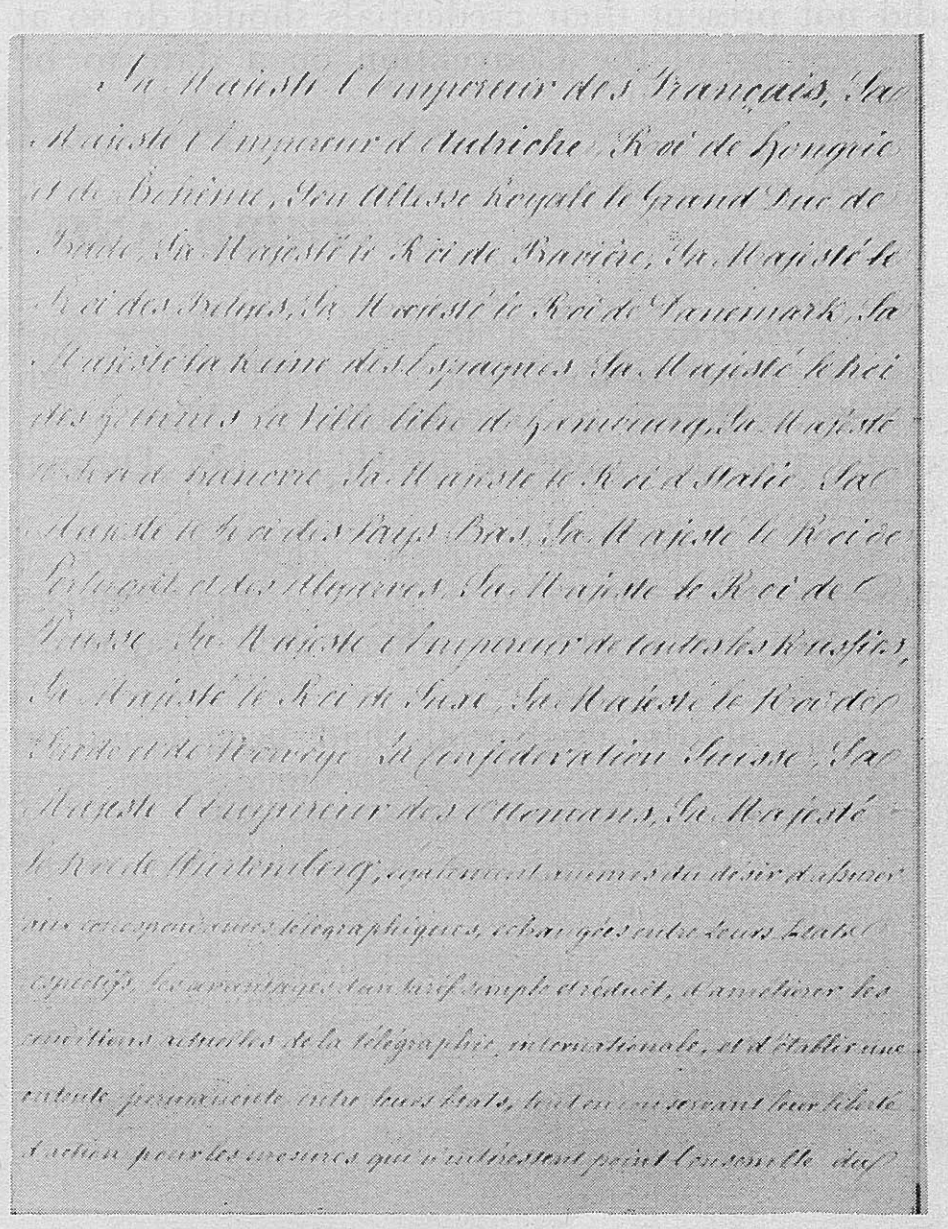
Weser, on the understanding that no advantage would be taken of the quite exceptional reservations that had been conceded to them in this respect. Other important provisions concerned the use of *registered* telegrams, which were to play the same role in the telegraph service as *registered* letters in the postal service, and of the *telegram to be forwarded;* the use of cypher for private telegrams, except in a few States which felt they were not yet in a position to authorize this means of correspondence; the recognition of the franc as the single monetary unit in establishing international tariffs. With regard to the tariffs themselves, the Committee had not confined itself to the establishment of principles, leaving the various Governments to arrive at mutual agreements for the reciprocal reduction of charges; despite the difficulties involved in such a work, it had succeeded in drawing up a general table (annexed to the Convention) which established a considerable reduction in the cost of telegrams. However, border States were not included in that table, since they had reserved the right to make their own special arrangements on all matters which were their exclusive concern.

Independently from the Draft Convention, the Committee had prepared a set of International Service Regulations which amplified the provisions of the Convention. Those regulations, a simple administrative record, did not require the approval of the Conference and could not become binding until the draft submitted to the plenipotentiaries had been approved.

Mr. Drouyn de Lhuys went on to point out that the plenipotentiaries were already aware of the work being done: they had kept in constant touch with their respective delegates; they had followed every stage of the negotiations and had helped them to a successful conclusion; thus they were aware of the wise and generous spirit of compromise, the practical knowledge and comprehension of the interests to be safeguarded, shown by the delegates in accomplishing the difficult task entrusted to them. The Minister of Foreign Affairs thought that the Conference would wish him to express its sincere gratitude to the delegates.

"Peace Congress"

Apart from the results whose advantages were immediately obvious and from which the public would shortly benefit, the Conference had a more important reason to congratulate itself, for, as Mr. Drouyn de Lhuys said, "We have met here as a veritable Peace Congress. Although it is true that war is frequently caused by a mere misunderstanding, is it not a fact that the destruction of one of the causes makes it easier for nations to exchange ideas and brings within their reach this prodigious means of communication, this electric wire which conveys thoughts through space at lightning speed, providing a speedy and unbroken link for the scattered members of the human race?" Moreover, His Excellency continued, there were mutual advantages to be gained from the meeting together of men of the highest rank, responsible for the great public services in their countries and representing every corner of Europe,



who could pool the results of their experience and form a sort of supranational instruction centre. It could truly be said that the personal relationships established among the directors-general of the telegraph services throughout the Continent would, in practice, foster official relations and help to overcome the difficulties that could not always be avoided even with the most carefully-designed regulations. In thanking the delegates for the part they had played in preparing the International Telegraph Code, his only desire was that they should take home with them the same happy impression that their visit of France would leave in his country.

H. E. Mr. Drouyn de Lhuys then asked Viscount de Vougy, Chairman of the Committee, to read out the Draft Convention.

The Director-General of the Telegraph Lines of France read out the document, which was approved by the Conference.

H. E. Prince Metternich, speaking on behalf of the Conference, expressed his warm thanks to Viscount de Vougy for the skill and courtesy with which he had guided the work of the Committee to such a successful conclusion.

H. E. Mr. Drouyn de Lhuys proposed that the plenipotentiaries should immediately initial the act to which they had just agreed, pending the preparation of the final documents for signature.

This formality was performed and at the same time several plenipotentiaries presented their cre-

dentials: Their Excellencies the Ambassadors of Prussia and Russia, the Ministers of Denmark, Hanover, Switzerland, Saxony and Wurtemberg.

It was agreed that those plenipotentiaries who did not present their credentials should do so at the signing of the Convention on a date to be decided later.

Before closing the meeting H. E. the Minister of Foreign Affairs thanked the plenipotentiaries for electing him their Chairman. Mr. Drouyn de Lhuys added: " Thanks to your kindness and co-operation my task was a sinecure that I was happy to fulfil. "

The meeting rose at two o'clock.

THIRD AND LAST MEETING

The International Telegraph Conference met for the third time, in the Ministry of Foreign Affairs Building, on Wednesday 17 May 1865, under the chairmanship of H. E. Mr. Drouyn de Lhuys.

After opening the meeting, the Minister of Foreign Affairs requested those plenipotentiaries who had not already presented their credentials to do so.

When all the credentials had been found to be in order and the various documents had been collated, the plenipotentiaries proceeded to sign the Convention which had been initialled at the previous meeting.

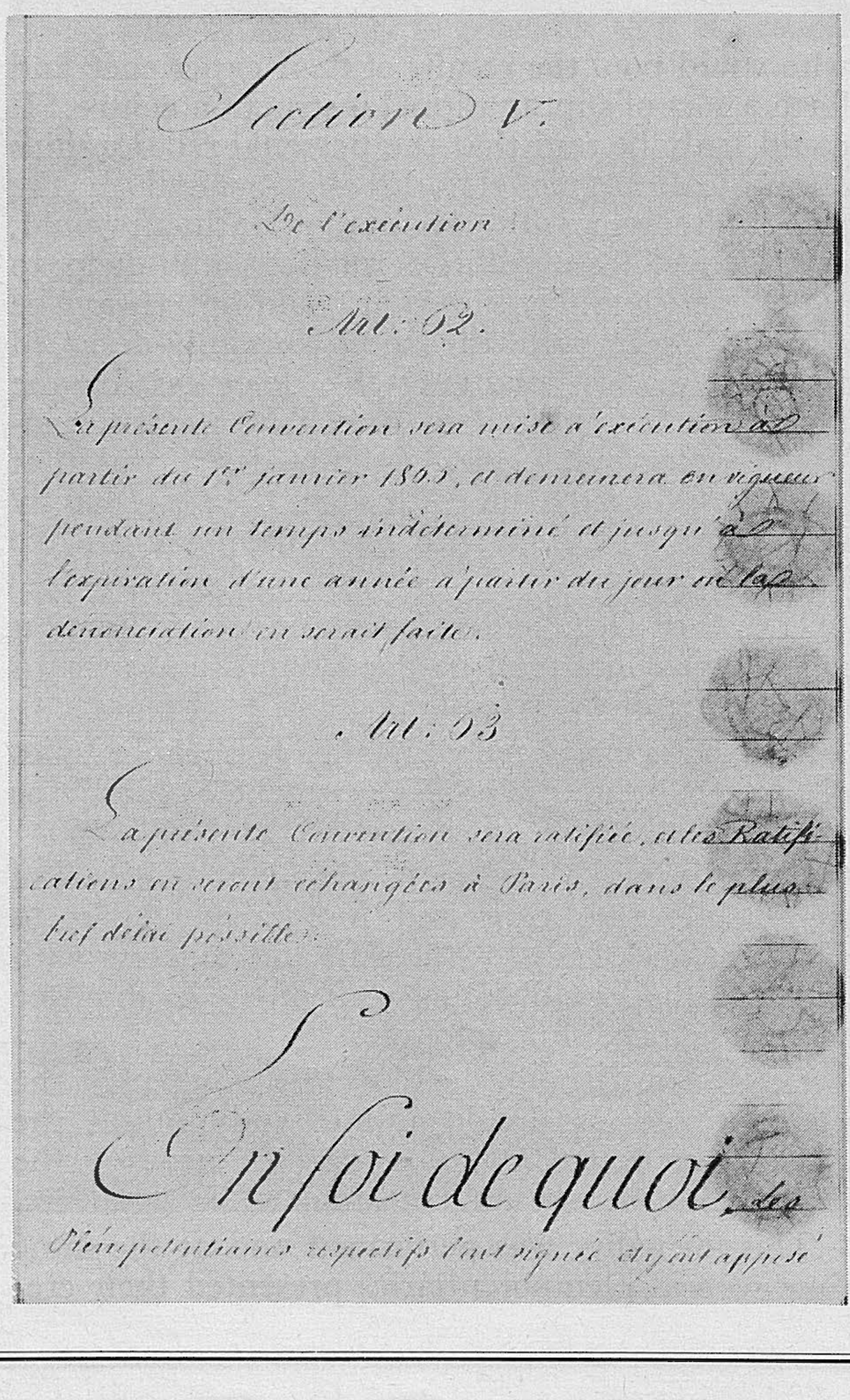
Before the Conference disbanded, H. E. Mr. Drouyn de Lhuys asked if he might make a couple of comments. First, he pointed out that since the Convention just negotiated had but one object — to establish regulations for an international telegraph service — the signing of the Convention would not have any political repercussions on the attitude of and relations among the various Governments.

His second comment related to the exchange of ratifications: he recalled the procedure adopted, to simplify matters, at the time of the ratification of the treaties on the surrendering of the Sound rights and the River Scheldt dues, and, following these precedents, the Conference decided that the Powers should exchange their ratifications through the intermediary of France.

On a proposal by H. E. Prince Metternich, the Conference unanimously passed a vote of thanks to H. E. Mr. Drouyn de Lhuys.

The minutes of the session were read and approved.

The meeting rose.


Section V.

De l'exécution

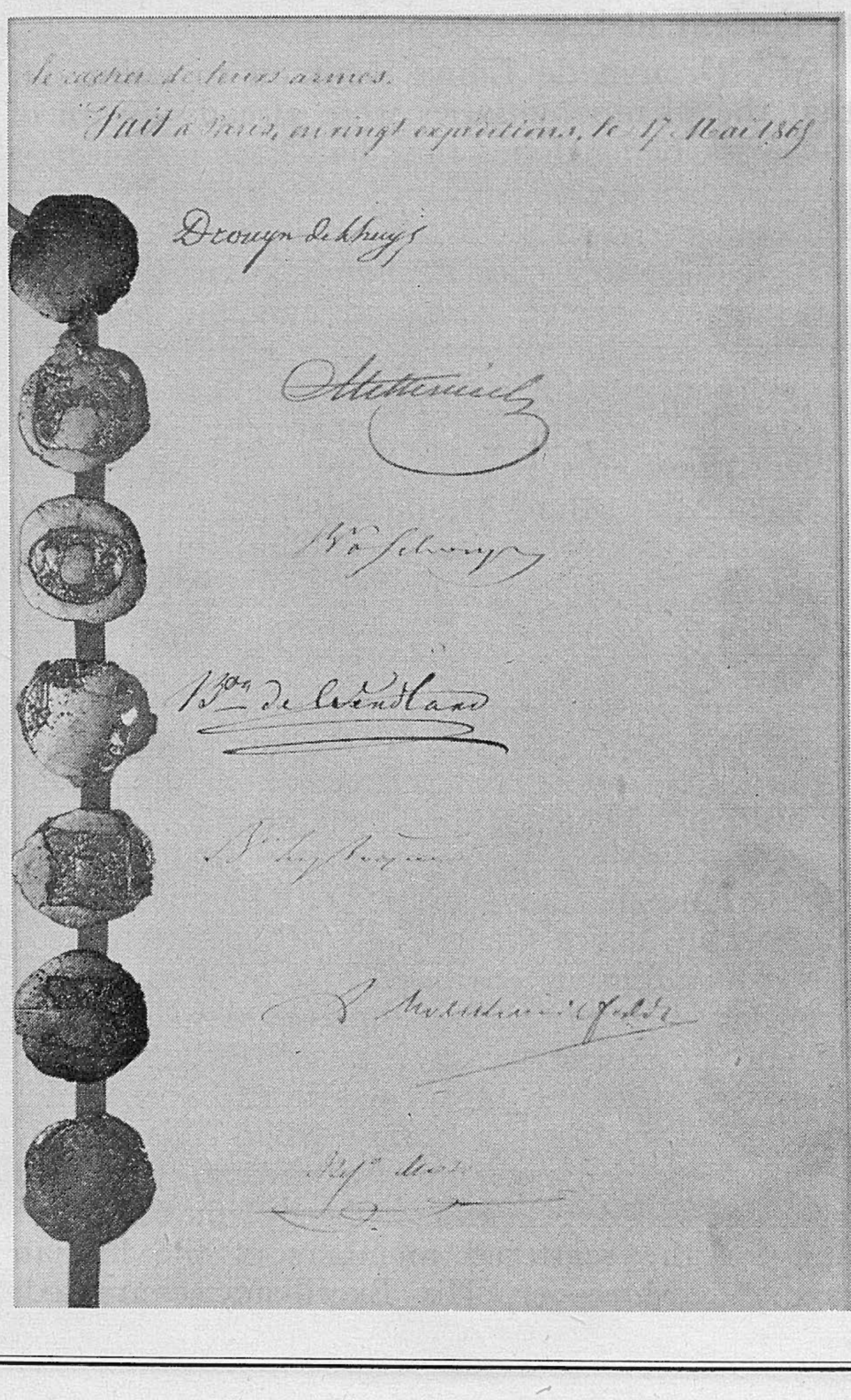
Art: 62.

La présente Convention sera mise à exécution à partir du 1er janvier 18[illegible], et demeurera en vigueur pendant un temps indéterminé et jusqu'à l'expiration d'une année à partir du jour où la dénonciation en serait faite.

Art: 63

La présente Convention sera ratifiée, et les Ratifications en seront échangées à Paris, dans le plus bref délai possible.

En foi de quoi, les Plénipotentiaires respectifs l'ont signée et y ont apposé


le cachet de leurs armes.

Fait à Paris, en vingt expéditions, le 17 Mai 1865

Drouyn de Lhuys

Metternich

THE COUNCIL'S 20th SESSION OPENS

The 20th Session of the Administrative Council opened at 3 p.m. on 12 April in Geneva. Mr. Clyde J. Griffiths, of Australia, was elected Chairman, and Mr. Rudolf Rütschi, of the Swiss Confederation, was elected Vice-Chairman.

In his address to the Council, the ITU Secretary-General Mr. Gerald C. Gross, who announced two years ago that he was retiring at the end of this year, made special reference to the Union's Centenary and to the recent outer space achievements of the USSR and the United States.

He said:

" As you already know, at the end of this present session, the Administrative Council has been generously invited, as a body, to Paris by the French Government to participate in a ceremony on Monday, 17 May, this being the exact date one hundred years ago on which the original Convention was signed. "

Referring to the recent outer space exploits, the Secretary-General said:

" I think it would be appropriate for me, Mr. Chairman, to conclude this statement by offering our sincerest congratulations to the distinguished representatives of the USSR and the United States on their countries' extraordinary achievements in outer space in the last month of March.

" The prowess of the astronauts of *Voskhod II* and the immense possibilities for satellite communications opened by the launching of *Early Bird* are notable pioneering efforts in our progress towards the use of outer space for the benefit of humanity—progress to which our Union has itself made significant contributions. "

Mr. Griffiths, the new Chairman of the Council, said:

" Australia has more than a passing interest in the outcome of the work of the Union. It is ' at the other end of the world ', with some of the longest international links to the main centres of the world. It is a small country in population but large in area, and in describing its climatical and geographical conditions, the various sections of the continent have been classified as

(ITU)

Studies at the opening meeting of the Council's session. — The Director of the CCITT and the Deputy Secretary-General ensure that they are properly tuned in, while the Secretary-General listens reflectively to the opening statement by the new Chairman. In the background, the Secretary-General's personal assistant concentrates, the sound technician looks doubtful while a third member of the Secretariat sits impassively under a waterfall.

Visit of Colombian Minister

The opening of the Council's session was honoured by the presence of His Excellency Dr. Cornelio Reyes, Minister of Communications of the Republic of Colombia, who addressed the meeting.

In the morning, he had paid a visit to the Secretary-General, with whom he is shown here in company with other members of the Colombian delegation. *From left to right:* Dr. Santiago Albornoz Plata, Mr. Gross, Dr. Reyes and Mr. Humberto Chaves Navía.

Monsoon, Sudan, Sahara, Mediterranean, China, Iranian and West European. We like to think that the combination of these somewhat difficult conditions, plus the desire to develop our telecommunication system in the best manner possible, allow us to contribute in some small way to the welfare of world communications generally. In fact, we feel that Australia's elevation to Chairmanship of this Council is a further recognition of the true world concept of the ITU. "

List of participants

Argentine Republic
Mr. Pedro Chaher
assisted by Mr. Osvaldo García Piñeiro

Australia (Commonwealth of)
Mr. Clyde James Griffiths
assisted by Mr. Richard Edmund Butler

Brazil
Mr. Ezequiel Martins da Silva

Canada
Mr. Alfred J. Dawson
assisted by Mr. Richard O. Hewitt

China
Mr. Gisson C. Chien
assisted by Mr. Y. T. Chang, Mr. Peter Chang, and Mr. Shitze Wu

Colombia (Republic of)
H. E. Dr. Cornelio Reyes
assisted by Mr. Humberto Chaves Navía and Dr. Santiago Albornoz Plata

Czechoslovak Socialist Republic
Mr. Miloslav Laipert
assisted by Mr. Stanislav Houdek

Ethiopia
Mr. Betru Admassie

France
Mr. Gustave Terras
assisted by Mr. Yves Place

Germany (Federal Republic of)
Mr. Hans Pressler
assisted by Mr. Johannes Kupper

India (Republic of)
Mr. Chaman Lal Vohra

Iran
Mr. Ghassem Shakibnia
assisted by Mr. Habib Monzavi

Italy
Dr. Ing. Federico Nicotera
assisted by Mr. Claudio Baudazzi and Mr. Gastone Cerenza

Japan
Mr. Ichiro Hatakeyama
assisted by Mr. Takashi Suerhiro, Mr. Akira Abe and Mr. Tsunahiro Furuya

Mexico
Mr. Lázaro Barajas Gutiérrez

Morocco (Kingdom of)
Mr. Mohamed Ben Abdellah

Philippines (Republic of the)
Mr. Manuel V. Feliciano
assisted by Mr. Roberto M. San Andrés

IRANIAN GIFT

On Tuesday, 13 April, the Iranian gift to the ITU to commemorate the inauguration of the new headquarters building was officially presented by Mr. Ali-Reza Bahrami, Minister, Counsellor and Deputy Permanent Representative of Iran to the European Office of the United Nations, acting for His Excellency Mr. Ali Mansour, the Permanent Representative, who was unfortunately indisposed. Mr. Bahrami, in making the presentation to the Secretary-General, was accompanied by Mr. Ghassem Shakibnia and Mr. Habib Monzavi, Iran's representatives on the Administrative Council.

(ITU)

The gift is a large Iranian carpet, of which an illustrative design showing a quarter of its surface had been sent to the ITU at the time of the inauguration of the building and which has subsequently been woven. Measuring 6 metres by 4.25 metres, it displays an intricate, multicolour pattern on a sky-blue background, with the ITU emblem in the middle surrounded by the words " Don du Gouvernement d'Iran " in Persian and French.

Our photograph shows, *from left to right*, Mr. Monzavi, Mr. Griffiths (Chairman of the Council), the Secretary-General, Mr. Bahrami and Mr. Shakibnia.

Spain
Mr. Julio de Paula Pardal
assisted by Mr. José Garrido Moreno and Mr. Electo García Tejedor

Switzerland (Confederation)
Mr. Rudolf Rütschi
assisted by Mr. Alfred Langenberger

Tunisia
Mr. Mohamed Mili

United Arab Republic
Mr. Adel Hassan Sherif

United Kingdom of Great Britain and Northern Ireland
Mr. Charles Edgar Lovell
assisted by Mr. H. C. Greenwood

United States of America
Mr. Carl Walter Loeber
assisted by Mr. William E. Denny

USSR
Mr. Ivan Klokov
assisted by Mr. Efim Motine and Mr. Fedor Kukareko

Yugoslavia (Federal Socialist Republic of)
Mr. Prvoslav Vasiljević
assisted by Mr. Konstantin Comić and Mr. Konstantin Horvat

United Nations Observer:
Mr. Norman G. Luker

UN Technical Assistance Board and Special Fund (for Europe) Observers:
Mr. Raymond P. Etchats
Mr. André Saenger

technical co-operation

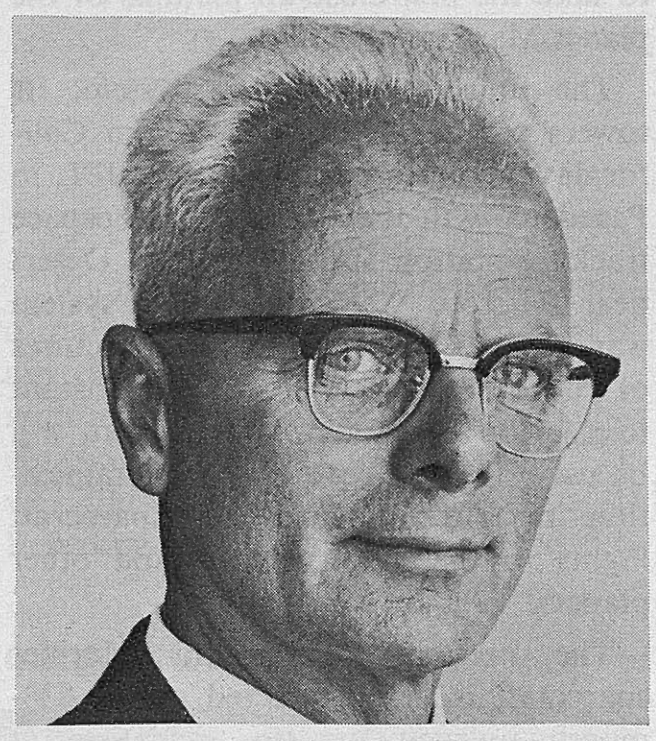
Afghanistan

Mr. Udin (ITU)

Mr. Anatoli Ivanovich Udin, Dean of the Radio Engineering Faculty at Moscow and Chairman of the Scientific Council of the Faculty, has been appointed Project Manager of the Special Fund project for Afghanistan the implementation of which has been entrusted to the ITU. After a short stay at ITU headquarters, Mr. Udin left for Kabul (Afghanistan) where he will direct the Telecommunication Training Centre to be set up under the project.

Algeria

Mr. Heinz Rudat, an engineer with Bavarian Broadcasting (Federal Republic of Germany), has returned from a year's mission in Algeria as an expert of the ITU, which lasted from April 1964 until the end of March 1965. Mr. Rudat's task was to co-operate with Algerian technicians in examining the conditions of broadcasting and television operation. In the course of his mission he made an extensive and detailed study of propagation for that purpose which will make it possible to extend the Algerian broadcasting and television networks.



Mr. Rudat (ITU)

BEHIND THE SCENES

Twelve miniatures from headquarters

5 — SUZANNE JENTZER

— 115 000 typewritten pages every year which, placed end to end, would stretch for about 35 km or, piled one on top of the other, would make a column almost 12 metres high (four floors of the Union headquarters building)...

— a staff varying from 20 to 80 persons, according to the work-load...

This, in brief (and the figures do not cover conferences held outside Geneva), is what the ITU shorthand-typing pool, which Mrs. Suzanne Jentzer has been running since 1949, is and does.

A native of Geneva, French by marriage, journalist in Paris, promoted second-lieutenant in the French Army for her work in the Resistance during the 1939-1945 War, Mrs. Jentzer joined the Union on 15 July 1948.

Her firmness with a smile and linguistic ability (she speaks French, English, Spanish, German and Italian) are combined with a keen sense of organization; for Mrs. Jentzer has to plan shift work (during conferences, three teams provide uninterrupted service from 9 a.m. to midnight), receive the documents to be typed, study their layout, distribute the work among her staff, check the fair copies... She also is responsible for testing all shorthand-typist candidates for employment with the Union.

And, as a gift for accuracy generally goes with a well-ordered mind, Mrs. Jentzer is able to give us the exact figures: to date, she has tested more than 1000 people and 452 typists have worked under contract in the pool! ...

national

Microwave system for unmanned spacecraft

A land-based microwave system, designed to relay data signals that control, guide and command the unmanned spacecraft of the United States National Aeronautics and Space Administration (NASA), is playing a key role in the present 575-million km space journey towards Mars on the *Mariner 4* space vehicle.

Built and leased by Western Union to the Jet Propulsion Laboratory (JPL) for two-way communication with unmanned spacecraft, the 264 km microwave system is now handling telemetry signals from the Mariner spacecraft which is scheduled to take the first close-up pictures of the planet Mars in mid-July.

The unusual microwave system, its towers perched high on southern California mountain tops, connects JPL in Pasadena with the Goldstone deepspace tracking station in the Mojave Desert near Barstow, California. The system was used to relay the first live pictures of the moon by *Ranger 9* for instant telecast on 24 March. The system will be used also for spacecraft communication on future unmanned spacecraft flights to the moon, Venus and other planets.

The present Mars-bound Mariner spacecraft is being directed on its 8½-month journey by JPL scientists at Pasadena. Their command and control signals are sent from JPL's space-flight operating facility *via* Western Union microwave system to Goldstone where they are instantly checked, verified, and then sent on to distant spacecraft through large radio antennas.

The spacecraft " talks " with earth *via* the big-dish antennas at Goldstone and the signals it sends then travel by microwave to computers in Pasadena. About 98 per cent of all spacecraft communication is from the spacecraft with only 2 per cent being earth commands.—*Western Union.*

Soviet Television third programme

As from 26 March, Soviet Television has inaugurated its third programme designed for educational purposes. The transmissions are based on syllabuses for secondary school students and on those for students preparing to go to secondary school. The programmes include talks on science an technology, and scientific as well as science-fiction films are shown.

Eminent Soviet scientists, among them Victor Ambartsoumian, President of the Academy of Science of the Soviet Socialist Republic of Armenia, Academicians Alexander Nesmeianov, Serguei Skazkine, Vladimir Enguelhard and Boris Rybakov, have agreed to take part in the broadcasts. The University of Moscow and the USSR Scientific Society *Znanie* are sponsoring the transmissions.—*Soviet Information Bulletin, Paris.*

Bermuda cables

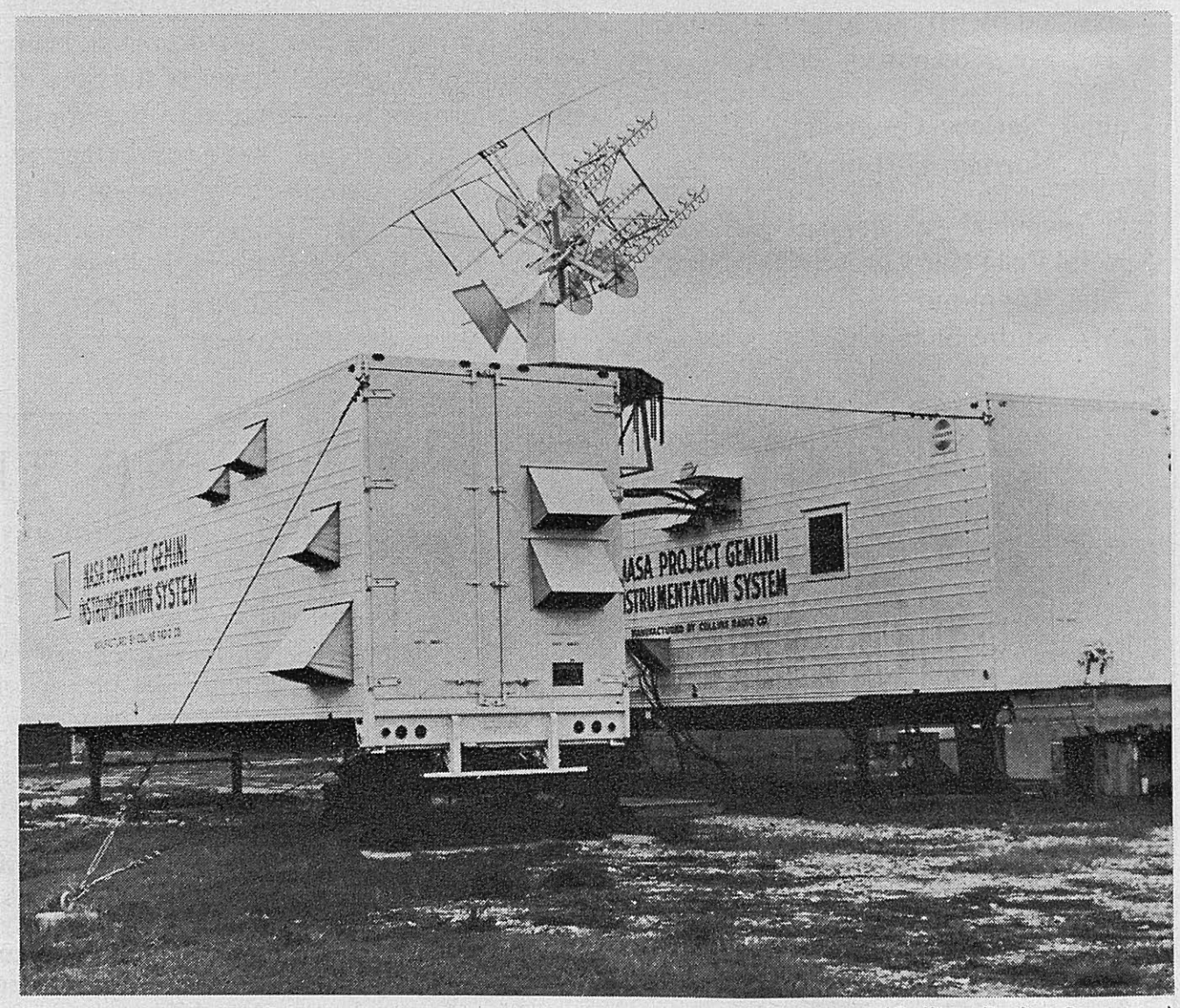
Big financial savings, the preservation of scenic beauty and the improvement of the telephone service in eastern Bermuda will be the result of an ambitious plan to be completed this year by the Bermuda Telephone Company.

The project is the biggest ever undertaken by the company and involves switching subscribers at present on the old Harrington exchange to a large new automatic (East) exchange on the other side of Harrington Sound, an eight quadrate kilometre expanse of water with a narrow outlet to the sea.

The company made an unusual decision: to lay two underwater cables directly across the Sound instead of going the long way round. A special 3.35 km cable was ordered from Standard Telephones and Cables Limited (STC) of London and laid last December. The second cable will be laid within the next few months.

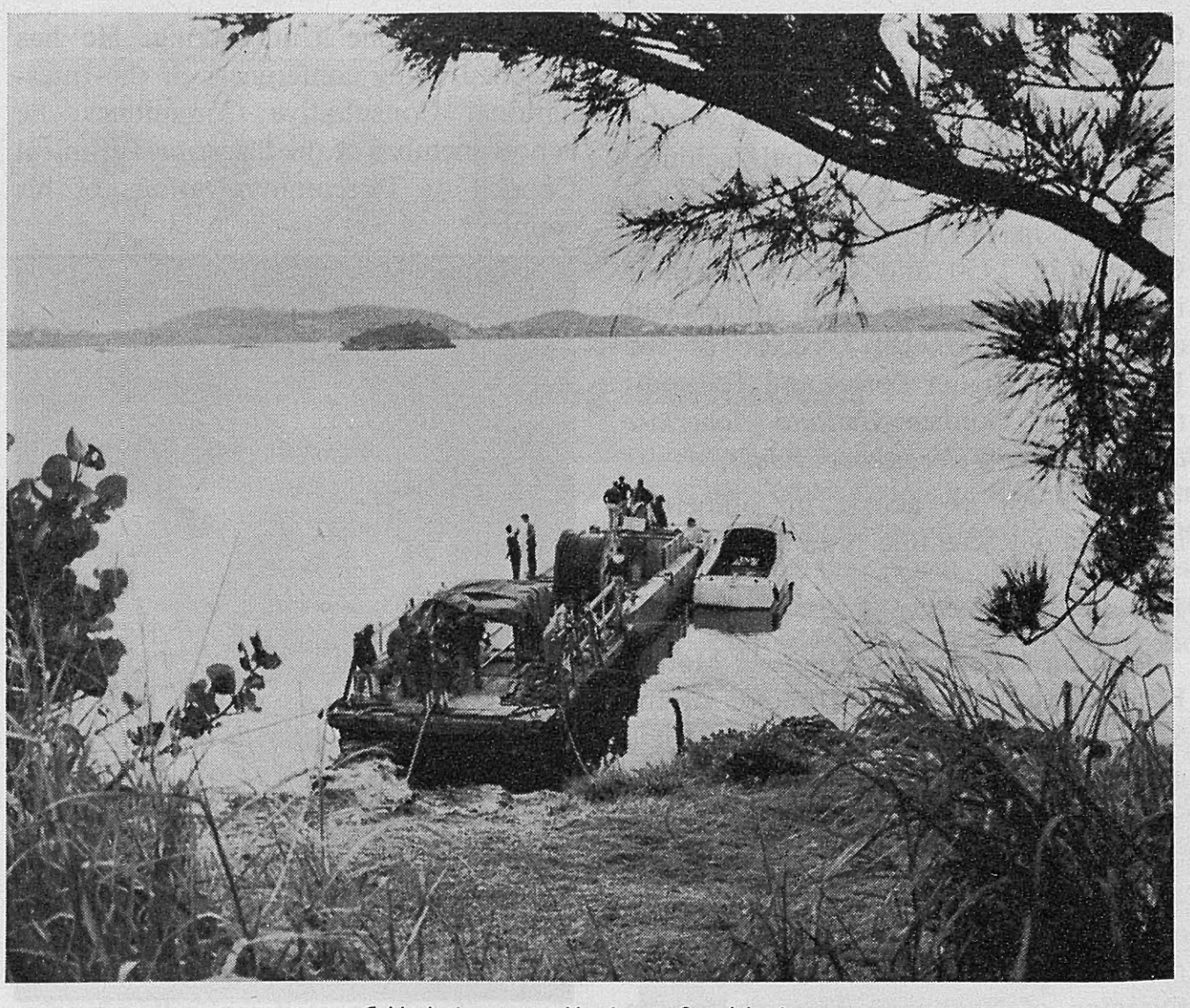
——►

Gemini radio link



(Collins Radio Company)

A typical command control installation of the United States National Aeronautics and Space Administration (NASA) with two transportable vans is shown at Corpus Christi, Texas, United States. These systems provided the radio link for flight control of the Gemini spacecraft and are part of the worldwide ground tracking network operated by NASA's Goddard Space Flight Centre.—*Collins Radio Company.*



Cable laying across Harrington Sound begins.

A cable round the Sound was ruled out because it would have been very expensive and ducting operations would have inconvenienced traffic. Overhead cables spoil the scenery and are also liable to hurricane damage.

The 400-pair cable is sheathed in lead and p.v.c. and armoured to protect it against the sharp coral on the sea bed. —*STC.*

Dangers of pirate radio

The danger to shipping created by the operations of " pirate " radio stations was underlined by the United Kingdom Postmaster-General, Rt. Hon. Anthony Wedgwood Benn, in the House of Commons on 22 March.

The Postmaster-General had been asked by Sir Knox Cunningham, for Antrim, South, for details of dates and places where this danger had arisen. In a written answer, Mr. Benn replied:

" The dates and places where interference from the pirate stations to communications between ships and the shore has been reported to my Department are:

" *From 'Radio Caroline'*

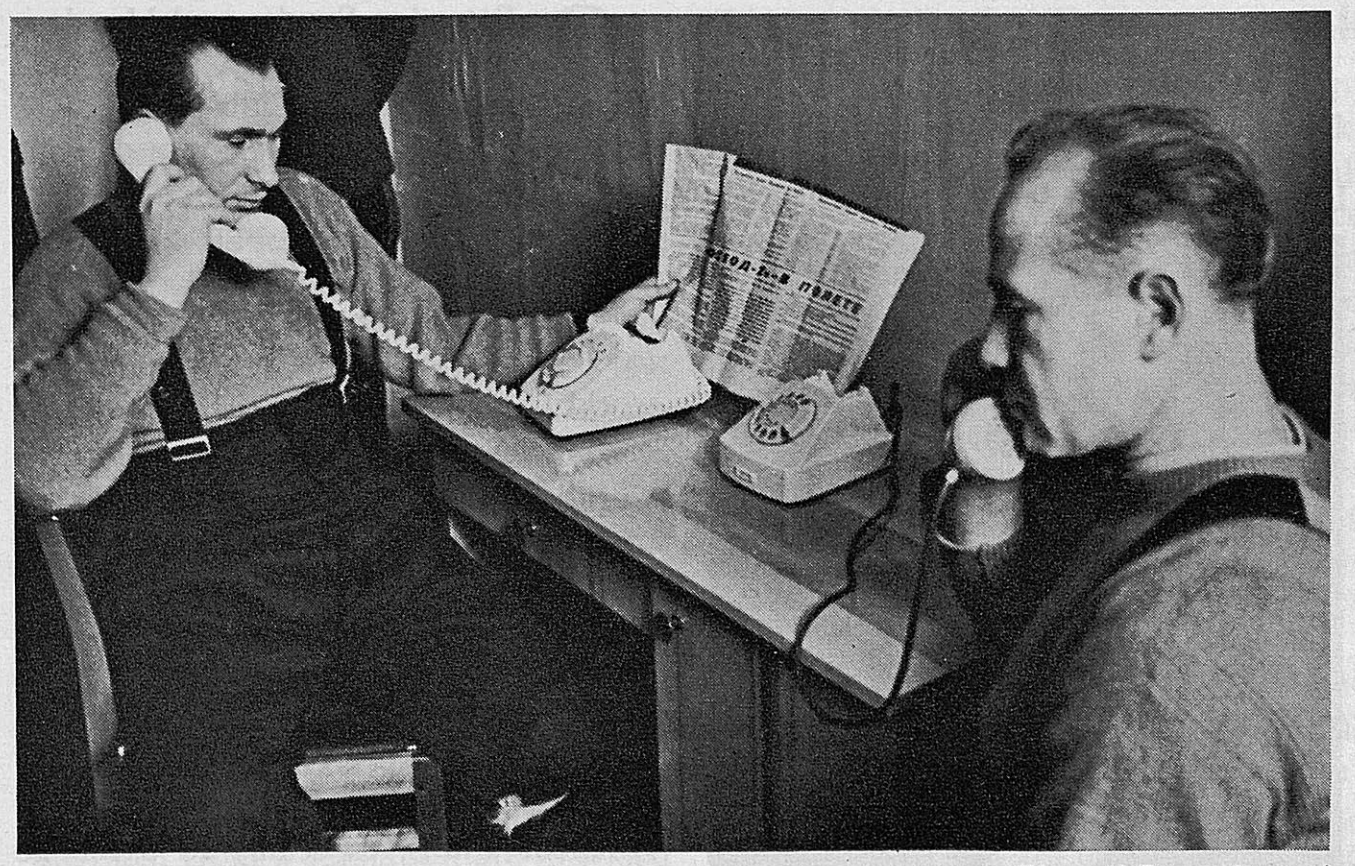
29 March 1964
South-East coast generally
1 April 1964
(continuing until at least 13 July 1964)
Antwerp area
2 April 1964
Essex coast
9 June 1964
Essex coast
11 June 1964
South-East coast generally
31 August 1964
Irish Sea
15 to 25 November 1964
Irish Sea

" *From other pirate radio stations*

12 January 1965
North of Scotland
13 January 1965
Netherlands
13 January 1965
Kent coast
14 January 1965
Netherlands
14 January 1965
East coast of Ireland
19 January 1965
Bristol Channel
19 January 1965
Kent coast
20 January 1965
Federal Republic of Germany
22 January 1965
North of Scotland
4 February 1965
Thames estuary
23 February 1965
Pembrokeshire
16 March 1965
Netherlands

"Many of these communications were of a routine nature, but the interruption of any of the authorized channels of communication between ships and the shore constitutes a danger to shipping. This was illustrated by the incident on 23 February last, when a lightship was pre-

Return to earth communications



(Novosti Press Agency)

On 19 March last the Soviet spacecraft *Voskhod 2*, manned by the astronauts Pavel Beliaev and Alexei Leonov, landed in the Perm region in the Urals. It will be recalled that, during this 26-hour flight, an astronaut, Alexei Leonov, left a spacecraft for the first time. Our photograph, taken on 21 March, shows Colonel Pavel Beliaev and Lieut.-Colonel Alexei Leonov talking on the telephone to Mr. Leonid Brezhnev.—*Novosti Press Agency.*

vented for about 30 minutes from passing an urgent report to the shore because both of the frequencies available were blocked, one of them by a pirate broadcasting station."—*United Kingdom General Post Office.*

Sir Edward Appleton

Sir Edward Appleton, Nobel prizeman in Physics, Member of the Royal Society, Honorary President of the International Scientific Radio Union (URSI), Principal and Vice-Chancellor of Edinburgh University, died on 21 April last.

He was " Telepersonality " of the month in the *Telecommunication Journal* in February 1962.

Personnel changes in Italy

On 1 February last, Engineer Ernesto Lensi was appointed Chief Inspector-General of Telecommunications in the Italian Administration.

Mr. Lensi (Telefotocronaca)

Eng. Lensi joined the Administration in 1933. He was made Principal Technical Inspector in 1943, Senior Technical Inspector in 1947, Technical Inspector-General in 1950 and Central Director in 1957. From 1959 until his present appointment, he was Director of the Institute of Higher Postal and Telecommunication Studies (*Istituto Superiore delle Poste e Telecomunicazioni*).

Mr. Lensi is active in numerous international scientific organizations.

Director of Telephones

Also on 1 February, Engineer Matteo Fariello was appointed Director of the State Telephone Undertaking (*Azienda di Stato per i Servizi Telefonici, ASST*).

Eng. Fariello, who joined the Administration in 1931, was appointed Director of Buildings and Installations in 1944 and took part in the post-war work of reconstruction. In 1951, he became Director of Technical Services in the State Telephone Undertaking. He has attended many conferences of the International Consultative Committees; he is now member of the Superior Technical Council of Telecommunications of his country.

Mr. Fariello

international

International Amateur Radio Club to celebrate the Centenary

On Saturday, Sunday and Monday, 15, 16 and 17 May, the International Amateur Radio Club (IARC) will celebrate the actual Centenary date of the Union. Six stations of the Club will operate with the call-signs 4U1ITU, 4U2ITU, 4U3ITU, 4U4ITU, 4U5ITU and 4U6ITU, in the amateur bands down to 2 metres, with stations around the world.

Club members from all parts of the world are expected to gather together on these three days to keep all six stations on the air for the 72 hours, to exchange messages with as many of the 400 000 licensed amateur stations as possible.

One of these six stations will be reserved for special messages from Amateur Clubs, especially to exchange greetings and messages in honour of the Centenary.

QSL awards will be issued for each radio contact and commemorative Centenary Operators Certificates issued to the operators. — *IARC.*

Regional Science and Technology Centre for Africa opened by UNESCO at Nairobi

UNESCO announced the opening of a Regional Centre for Science and Technology for Africa in April at Nairobi, the capital of Kenya, as the first in an international network serving the world's major developing regions.

The long-term goal of the African centre will be to help governments implement the *Lagos Plan* adopted last August at an international conference on the organization of research and training in Africa.

The plan, approved at Lagos by 28 African countries, calls for a fifteen-fold increase in the number of scientists in Africa during the next fifteen years in order to speed efficient utilization of the continent's natural resources. A UNESCO survey last year of 41 African countries showed no more than 5000 scientists there, but between 50 000 and 70 000 will be needed by 1980.— *UNESCO.*

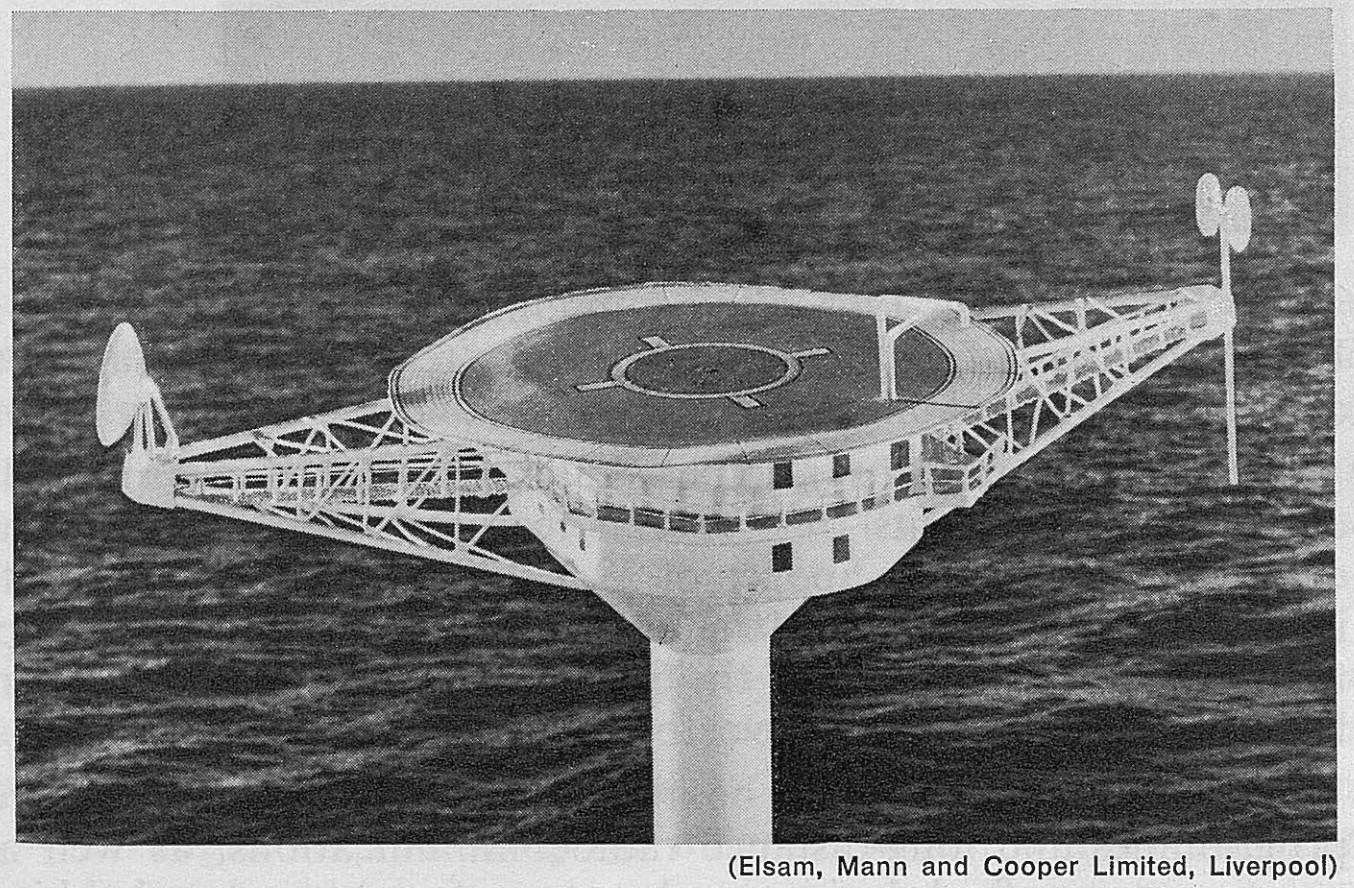
technical

Transoceanic telecommunication via floating seastations

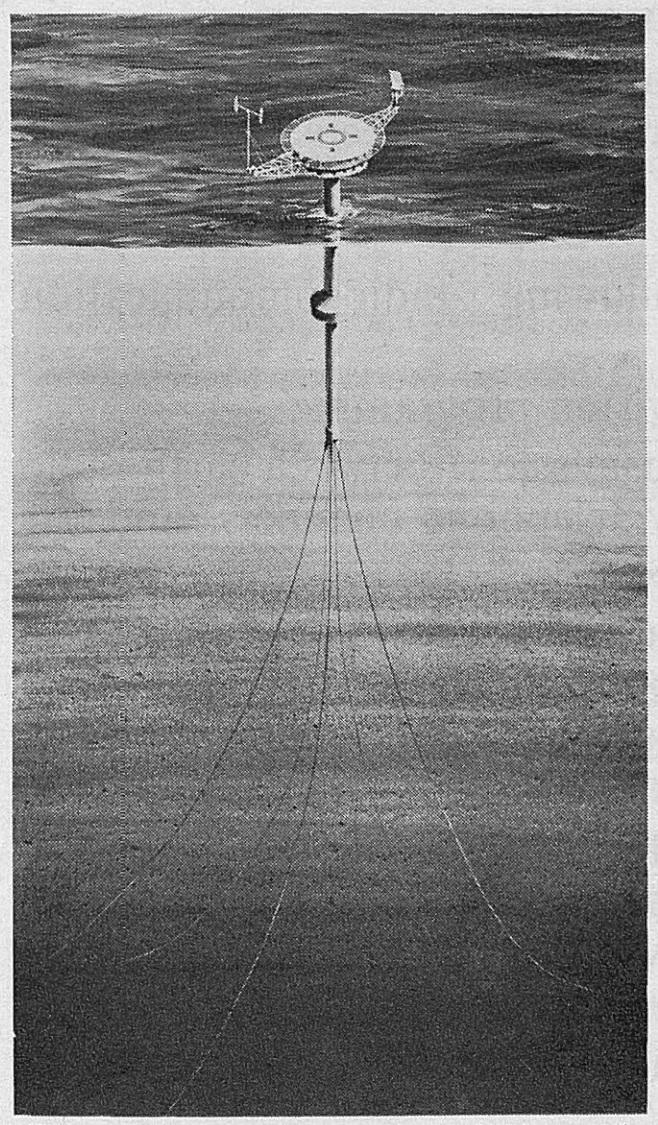
A new company called *Seastation Telecommunications Limited* has been formed in the United Kingdom to develop and supply transoceanic telecommunication systems to provide urgently needed navigation and communication facilities for the rapidly increasing high-speed air traffic, especially on the North Atlantic routes. These facilities will consist of permanent floating seastations for carrying radio, radar and other aeronautical navigational equipment, interconnected with each other and with shore stations by a submarine cable communication system.

The new company, in collaboration with the Ministry of Aviation, is undertaking a design study for such a system.

A floating seastation has been designed which can be moored in mid-ocean in deep sea and which is suitable both for the termination of a submarine cable and also for the installation of radio equipment. Communications from aircraft in the vicinity of the seastation can be passed to the distant shore by means of the submarine cable and reliable circuits of the very highest quality can be obtained from aircraft to land and *vice versa*. The installation of seastations at intervals along the routes overflown by aircraft crossing the oceans can provide entirely dependable communication with these aircraft at all times.



(Elsam, Mann and Cooper Limited, Liverpool)



(Elsam, Mann and Cooper Limited, Liverpool)

A seastation consists of a tubular structure typically about 122 metres in length and 5 metres in diameter, floating vertically in the sea with the greater part of its length immersed. The top end of the cylinder supports a superstructure well above the reach of waves and providing accommodation for equipment, for crew, for a helicopter landing deck and for aerial systems. The bottom end of the cylinder is moored by three cables to anchorages on the sea bottom. The submarine telephone cables leave the bottom of the seastation and fall in catenaries to the ocean bed. Power is supplied by diesel oil generators and fuel supplies and provisions for a considerable period are carried.

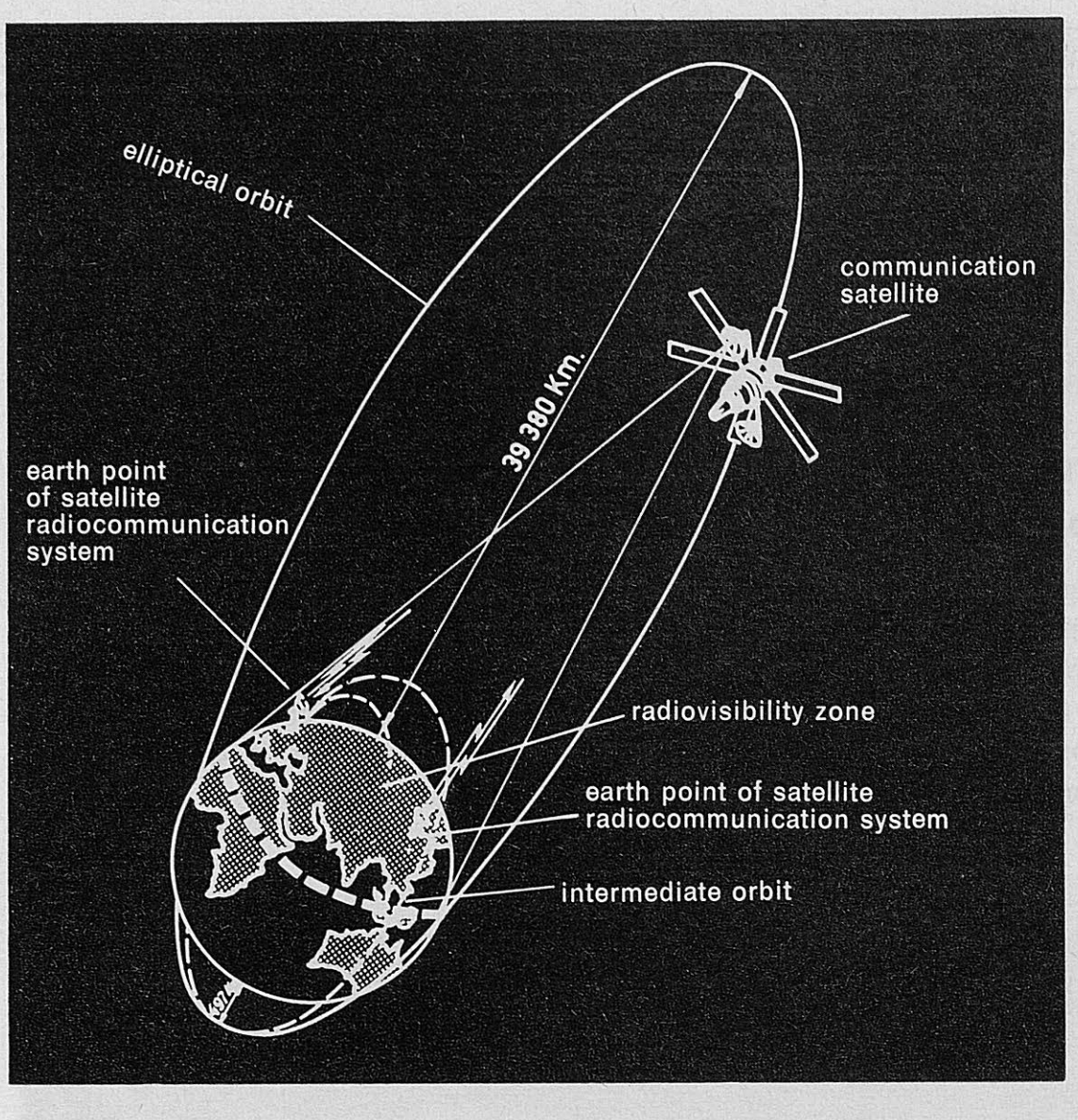
The primary communication services provided from a seastation are intended to be radio in the VHF and UHF wavebands for air traffic control, for airline company traffic and for passenger-to-shore conversations. But this is by no means the only use of seastations. A number of navigational services for aircraft can be accommodated and primary and secondary radar facilities can be added. Weather reporting and weather forecasting are other uses and all the services can be envisaged as applicable to ships as well as to aircraft. Broadly speaking a survey of the hydrospace surrounding the seastations as well as the airspace above them could be arranged and air and sea safety services could become important. Whatever the service, complete information relating to it can be passed immediately to the shore and the operation can be monitored or controlled from land if desired.—*Seastation Telecommunications Limited.*

Helping deaf children to speak

Hi-fi stereo headphones are now helping deaf children to learn to speak. Connected to a microphone and a small amplifier, these headphones can produce enough undistorted volume to enable a severely deaf child to listen to his own first efforts at forming sounds and words.

To meet this need, and for other applications in sound studios and language laboratories, Standard Telephones and Cables Limited (STC) have introduced a new combined headphone/microphone unit at a price much lower than normal.

The headphones are padded for comfort and can handle, without distortion, sounds exceeding the 'threshold of pain' level for a normal ear. Since the earphones are wired for binaural use, the volume to each ear can be adjusted individually to suit the degree of deafness. In addition, instructions can be given to a group of children with each child's headphones connected to a common amplifier.—*STC.*



CENTE
SATEL

Molnya 1

Long-distance radiocommunication system

◂ *via the satellite Molnya 1*

On 23 April, 1965, the communication satellite *Molnya 1* was launched from the Soviet Union. Its basic function will be to relay television programmes and to provide two-way multi-channel radiotelephones, phototelegraph and telegraph links over long distances.

A few words must also be said about the orbit of Molnya 1 which, like the other parameters of the system, has its own special features. The communication-satellite was placed on an elliptical orbit with an apogee of 39 380 kilometres, a perigee of 497 kilometres and an angle of inclination of 65 degrees. It takes 11 hours 48 minutes to complete one period, during which it travels for a few hours over the Soviet Union. This permits fairly long connections to be set up between Moscow and Vladivostok.

The equipment on board the satellite comprises a repeater to retransmit television programmes and long-distance radiocommunications, as well as control and measuring instruments, antenna-feed devices, and systems for steering and orbit correction.

The satellite's repeater works on the principle of linear amplification of the earth stations' radio signals. The use of such repeaters makes it possible to receive the signals from earth, simultaneously to amplify them to the required level, and retransmit them to earth without distortion.

The earth-controlled satellite repeater offers the following radiocommunication possibilities:

— reception and retransmission by the satellite of one television programme

— simultaneous radiocommunication (reception and retransmission) between earth radio stations, with provision of a large number of two-way telephone channels, and the possibility of secondary accommodation of telegraph systems

The equipment of the earth stations for the long-distance radiocommunication system using Molnya 1 comprises a complex assembly of large parabolic antennae with rotary and programming devices and tracking systems, control and measurement apparatus, and an assembly of interconnected radio reception and transmission stations.

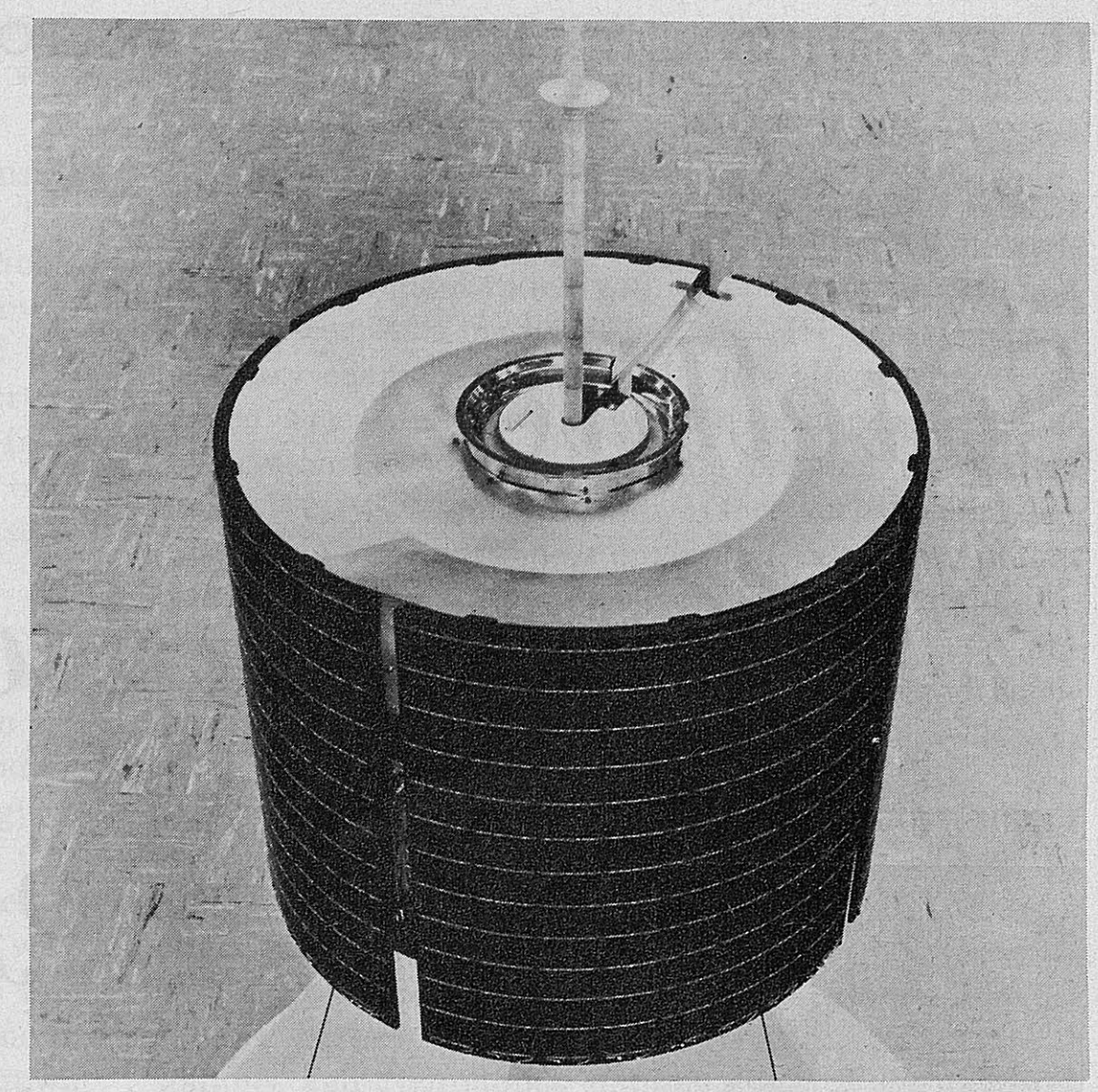
The successful flight of Molnya 1, the normal working of all instruments on board and of the equipment in the earth stations prove that such systems have a great future and may be economically advantageous, especially for the transmission of television over great distances and for communications with remote areas of the country.

The successful launching of Molnya 1 is a striking illustration of the latest successes of Soviet science and technique.—*Pravda.*

NARY LITES

Early Bird

A prototype of HS-303 *synchronous altitude spin-stabilized satellite for initial commercial system* ▸



Launched on 6 April last from Cape Kennedy in the United States, the telecommunication satellite HS 303—better known as *Early Bird*—was put into an almost perfect synchronous equatorial orbit. It is quasi-stationary over the Atlantic, between Brazil and the Gold Coast, at approximately 28 degrees longitude West. It completes its orbit in 23 hours 57 minutes 1/10th of a second, a time which is very close to the duration of the sidereal day. Its apogee is 35 796 kilometres and its perigee 35 787 kilometres.

Built by the Hughes Aircraft Company for the Communications Satellite Corporation (Comsat), an American undertaking established to organize and operate satellite communication, Early Bird resembles the *Syncom* satellites in size and appearance. It is in the form of a drum about 71 cm in diameter and 54 cm high, not including the antennae and the apogee motor. It rotates in a stabilized position. It weighs 38.5 kg.

Electric power supplied by 6000 solar cells and two cadmium-nickel batteries. The solar cells supply 45 watts when normally activated by the light from the sun.

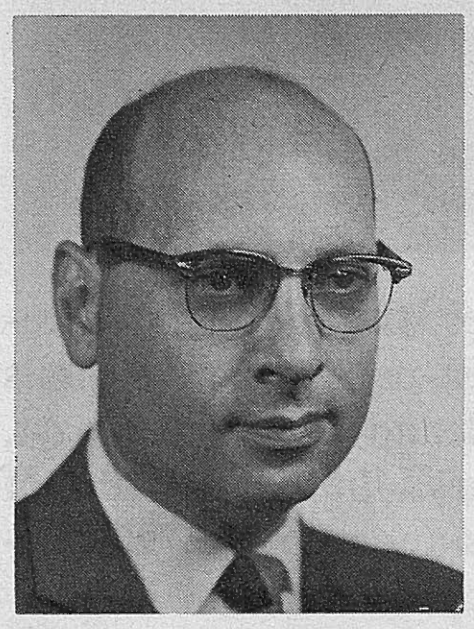
The Early Bird electronics includes communications, command and telemetry. The communications system is a redundant, frequency-translation, active-repeater. Ground station signals are received by redundant receivers which are interconnected in such a way that they can drive either one of the satellite's two travelling wave tube transmitters. Either tube may be selected on command but only one may be activated at a time. The output of each is 6 watts.

Transmitting antenna gain is 9 db and the pattern is independent of the angle about the spin axis. The beam is conical with a maximum gain in the direction of the ground terminals and is about 11 degrees wide. The communication system provides more than 240 quality duplex voice channels and duplex television operation.

Under the agreement establishing a provisional arrangement for a worldwide commercial satellite communication system, signed by 45 countries (see *Telecommunication Journal*, April 1965), Early Bird will shortly be used on a commercial basis to provide relay links (in particular, telephone and television) between North America and Western Europe.

The first transmissions made on a trial basis were entirely satisfactory.—*Comsat-USIS.*

Satellite Communications of the future



by

Leonard JAFFE

Director, Communication and Navigation Programs
Office of Space Science and Applications
National Aeronautics and Space Administration
(NASA)

THE INTERNATIONAL TELECOMMUNICATION Union and its Consultative Committees have been concerned since 1958 with the impact of artificial satellites on the development and regulation of international communication. Space communications received considerable attention at the Geneva Radio Conference in 1959, and at the Xth Plenary Assembly of the International Radio Consultative Committee (CCIR) in February 1963. And in October and November 1963 the Extraordinary Administrative Radio Conference on Space Communications made extensive allocations for space services.

By far the largest single service allocation—2800 Mc/s—was made to the communication-satellite service. This was indeed unusual, for at the time the communication-satellite service did not yet exist, except for a few experimental satellites. It was plain to most of the delegates that satellites would become a major element of international communications, and that frequencies must be provided for their use in international trunk service. Nevertheless, it is not yet clear how extensive this trunk service will become, nor is it clear what other telecommunication services might benefit from the use of satellites.

At this early stage in the evolution of satellite communications, it is quite difficult to predict with any degree of certainty the extent to which satellites can and will be used for communications. It is as if one were asked in 1908 to discuss the future of aircraft, only four years after the first successful powered flight. However, the National Aeronautics and Space Administration (NASA), United States of America, has given much thought to this subject, in deciding what course to pursue in advancing satellite technology.

We are just emerging from the initial, experimental era of satellite communications. As I write this, the technical feasibility of both active and passive communication satellites has been proven conclusively; on 6 April 1965 the first commercial " common carrier " communication satellite was launched.

The early commercial systems will employ active satellites because at their present stage of development, passive satellites are not economically competitive. However, it is possible that technological improvements could change this picture. Passive satellites offer impor-

tant advantages in reliability, bandwidth, and multiple access capability, if they can be made competitive with active satellites.

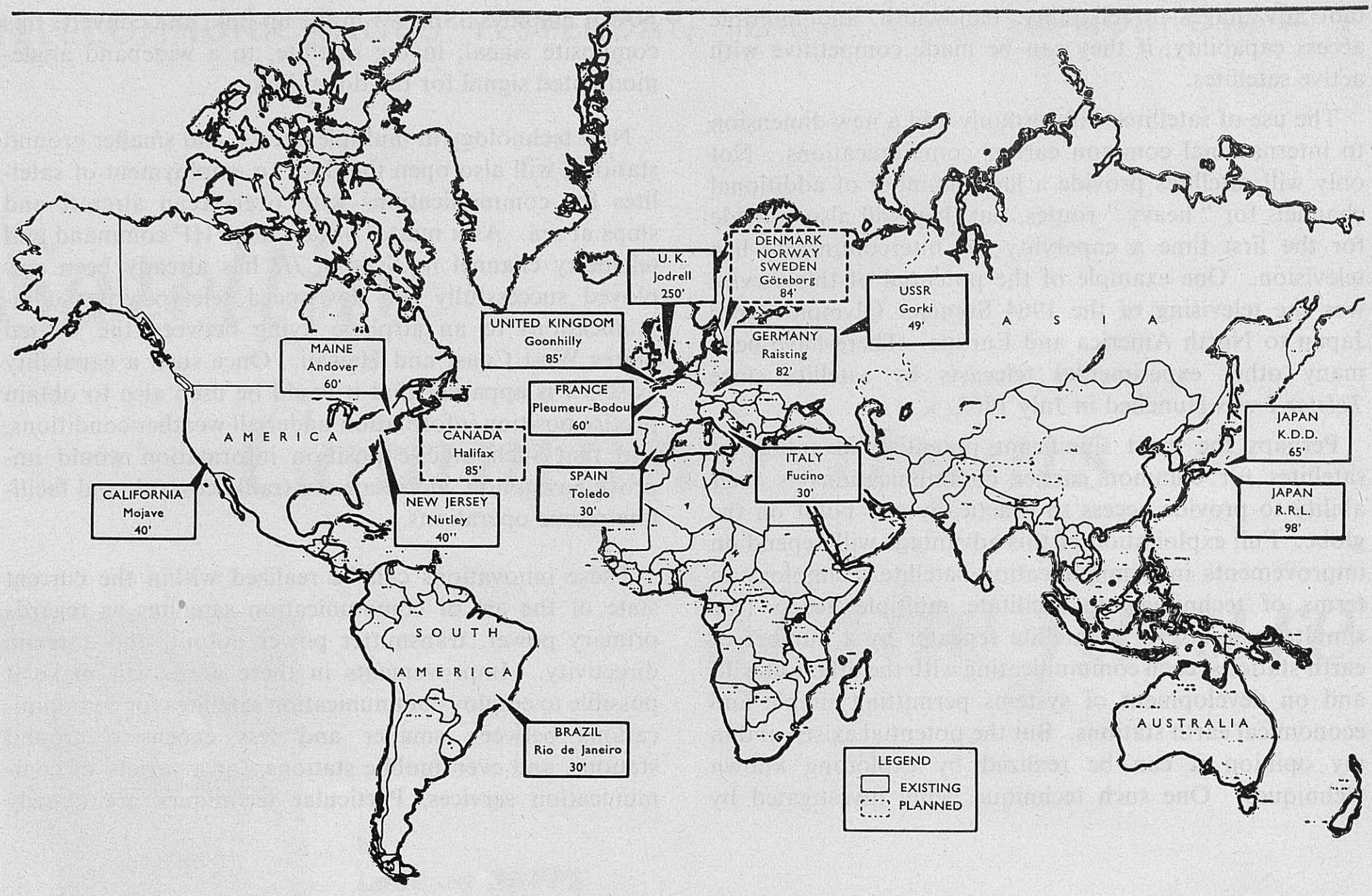
The use of satellites will certainly add a new dimension to international common carrier communications. Not only will satellites provide a large number of additional channels for " heavy " routes, but they will also provide for the first time a capability for intercontinental live television. One example of the potential of this service was the televising of the 1964 Summer Olympics from Japan to North America and Europe. There have been many other experimental telecasts by satellite since *Telstar I* was launched in July 1962.

Perhaps the most significant potential advantage of satellites for common carrier communications is their ability to provide access to practically any point on the globe. Full exploitation of this advantage will depend on improvements in communication satellite technology in terms of techniques to facilitate multiple access (the simultaneous use of a satellite repeater by a number of earth stations, each communicating with the others at will) and on development of systems permitting simple and economical earth stations. But the potential exists, and in my opinion it can be realized by exploiting known techniques. One such technique being investigated by NASA employs SSB-AM in the up-link, and converts this composite signal, in the satellite, to a wideband angle-modulated signal for the down-link.

New technology in multiple access, and smaller ground stations, will also open the door to employment of satellites for communications with over-ocean aircraft and ships at sea. As a matter of fact the VHF command and telemetry channel in *Syncom III* has already been employed successfully for slow-speed teletypewriter communications to an airplane flying between the United States West Coast and Hawaii. Once such a capability exists, it is apparent that it could be used also to obtain precise position information under all weather conditions, and that such precise position information would improve navigation, aid in air-sea traffic control, and facilitate rescue operations.

These innovations can be realized within the current state of the art of communication satellites as regards primary power, transmitter power output, and antenna directivity. Improvements in these areas will make it possible to employ communication satellites for communications between smaller and less expensive ground stations, and even mobile stations, for a variety of communication services. Particular techniques are already

Oct. 7, 1963: U Thant addressing the ITU's Conference on Space Radiocommunications in Geneva from New York via Telstar



Existing and planned communication satellite ground stations as of September 1963. Jodrell Bank (United Kingdom) and Gorki (USSR) participated in Echo II *experiments only.*

being investigated by NASA, including both electronic and mechanical methods for " despinning " the antenna on a spin-stabilized satellite, and means—such as gravity-gradient stabilization—for keeping one face of a satellite pointed at the earth throughout its orbit. This would permit use on the spacecraft of fixed, pencil-beam antennas.

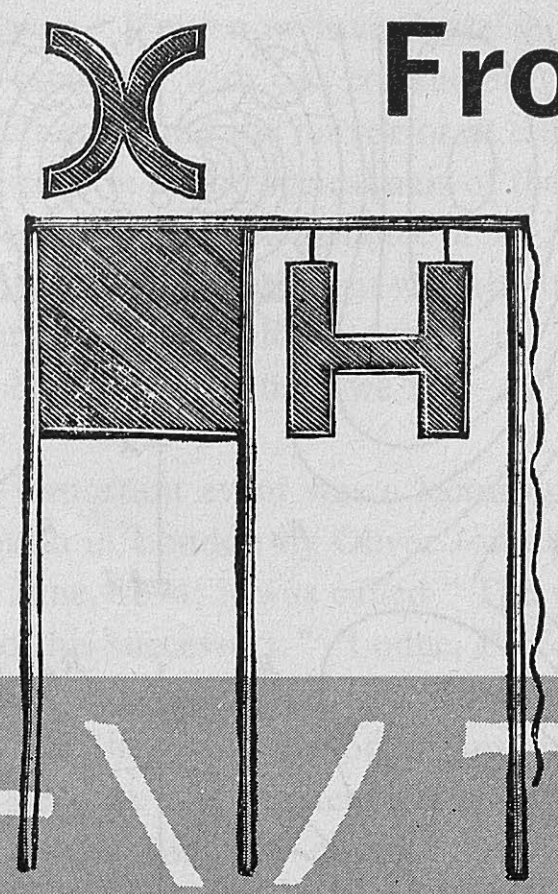
Another potential area of application is direct broadcasting, both aural and visual, to conventional home receivers. The technology needed for aural broadcasting is realizable in the next three to six years, but the technology necessary for television broadcasting is considerably further away in time. Among other things, a television broadcast satellite will need many kilowatts of electrical power and will need high power transmitting components capable of operating satisfactorily in the environment of space. This application of communication satellites has already been studied in some depth in the CCIR (see CCIR Report No. 215, " Feasibility of direct sound and television broadcasting from satellites, " Xth Plenary Assembly, Geneva, 1963), and the Space Radiocommunication Conference recommended (Recommendation No. 5A) that the CCIR expedite its study of this question.

Of course, there are also non-technical factors which must be given careful consideration in deciding on the use of satellites for direct broadcasting: these include commonality of language, national sovereignty, difference of times, etc.

Technically, there is no reason to doubt that communication satellite technology will advance to the point where almost any telecommunication services now performed with terrestrial facilities could be performed as well with communication satellites. However, I do not advocate that satellites be used indiscriminately, in lieu of terrestrial facilities. Technical feasibility alone is not the deciding factor: it will have to be obvious, also, that the service can be performed better with satellites than with other facilities, and at a competitive " cost " (not only in money, but also in the number and skills of the people involved in furnishing the service). And it is in this area that the ITU can continue to perform the services which it has performed so well in the past. As I noted at the outset, the CCIR is already acting with strong initiative to review and assess space communications technology, and the ITU has already conducted an Extraordinary Administrative Radio Conference for the sole purpose of allocating frequencies for space radiocommunications. It is indeed encouraging to see these actions occur in time to insure an orderly integration of satellites into the global communications complex.

(Original language: English)

During the ITU's Centenary Year, the Journal *is presenting a condensed serialization of this book published in March 1965*



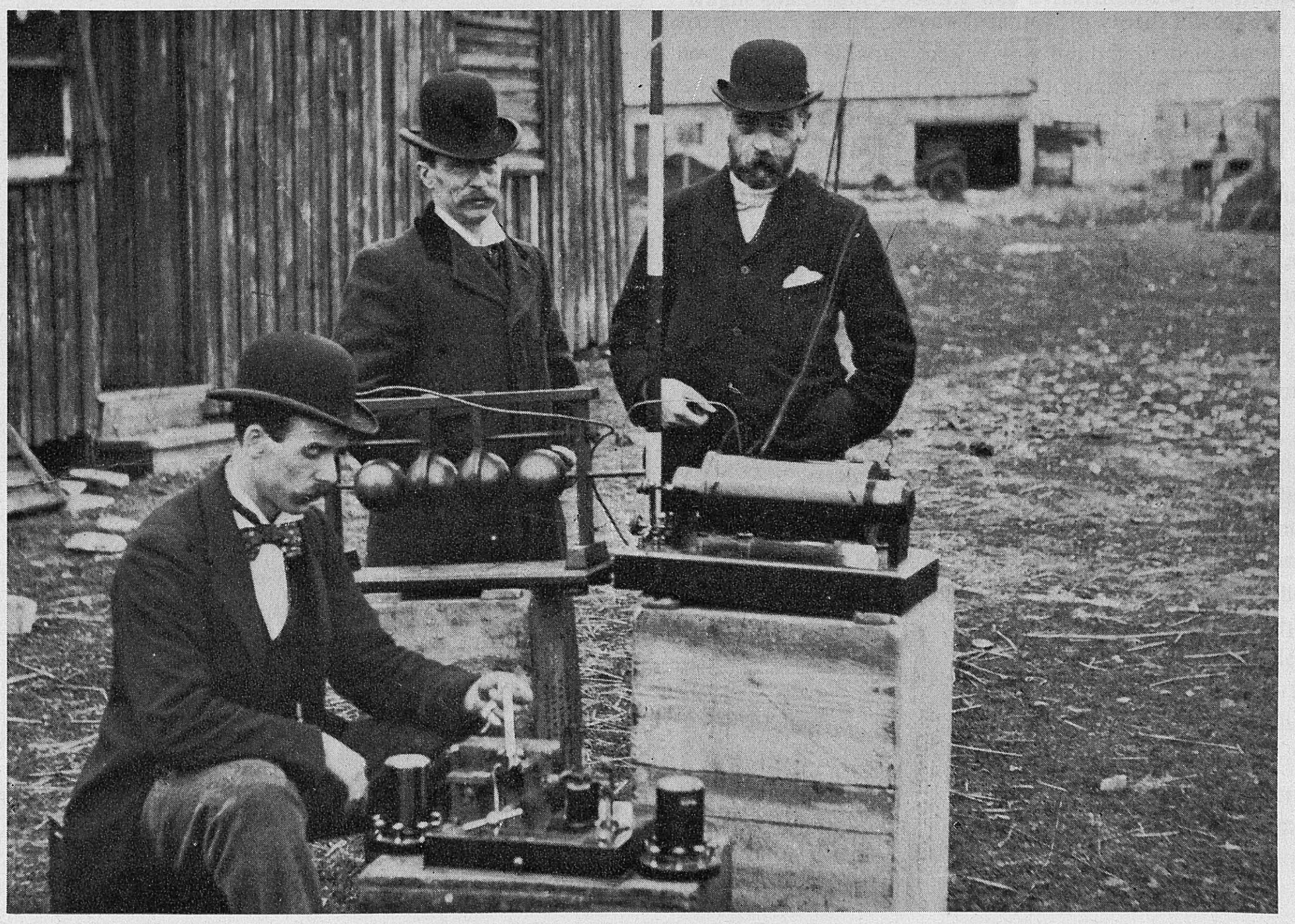
From Semaphore to Satellite

V

The Inventors of Wireless Telegraphy

RADIO BROUGHT A VERITABLE revolution to all our communications. The story of radio begins with Joseph Henry (1797-1878), an American physicist, who discovered in 1842 that electrical discharges were oscillating. A gigantic step forward was taken by James Clerk Maxwell (1831-1879), a Scottish physicist whose treatise on " Electricity and magnetism " was published in 1873. By purely mathematical reasoning, Maxwell showed that all electrical and magnetic phenomena could be reduced to stresses and motions in a medium, which he called the ether. Today we know that this " imponderable electrical medium " does not exist in reality, any more than the equator of the geographer or the average man of the statistician. Yet the concept of an ether allowed Maxwell to put forward his theory that the velocity of electric waves in air should be equal to that of the velocity of light waves, both being the same kind of waves, merely differing in wave length. This we know today to be an elemental truth.

Post Office officials examining Marconi's apparatus when in 1897 he successfully communicated by wireless across the Bristol Channel, England. This was the first time a wireless transmission was conducted across water.



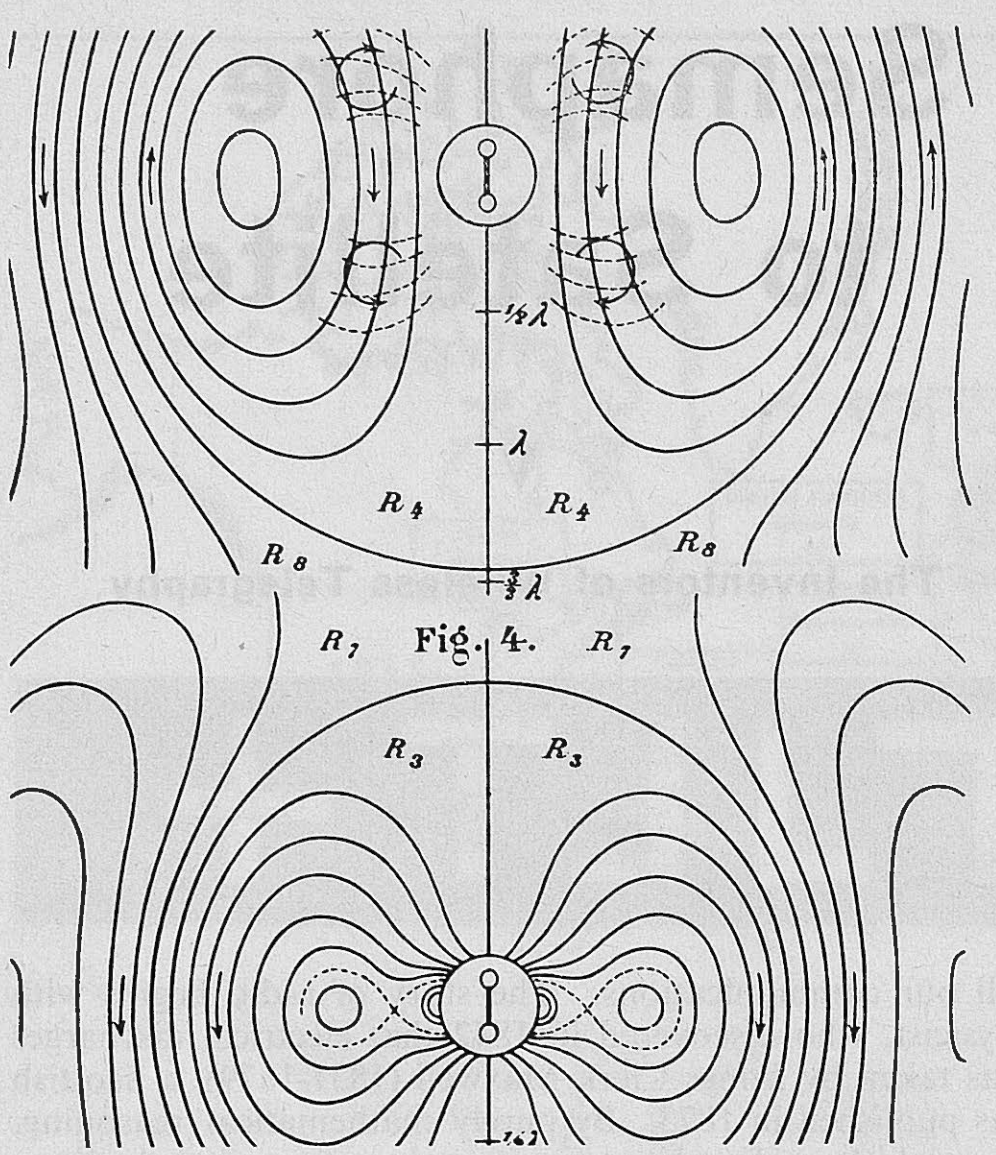


Fig. 4.

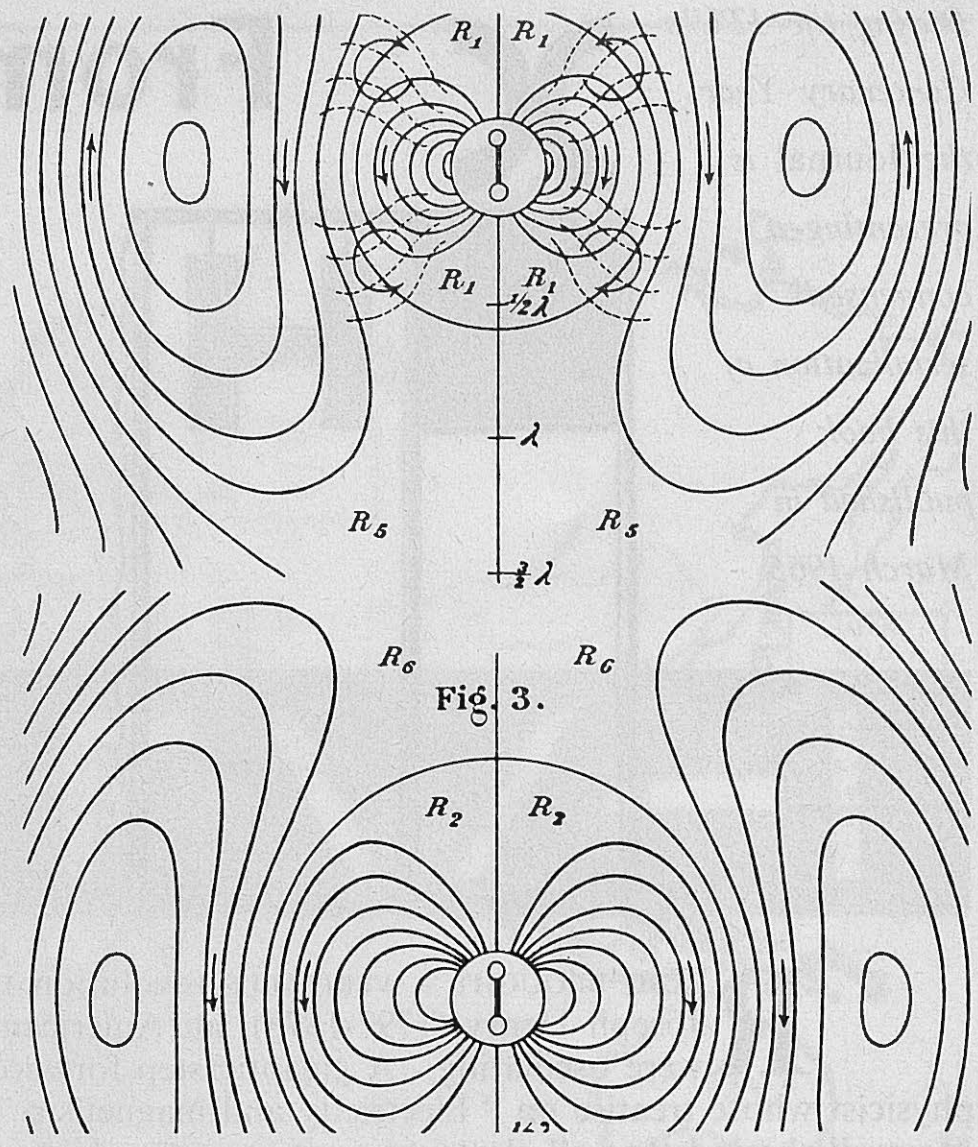


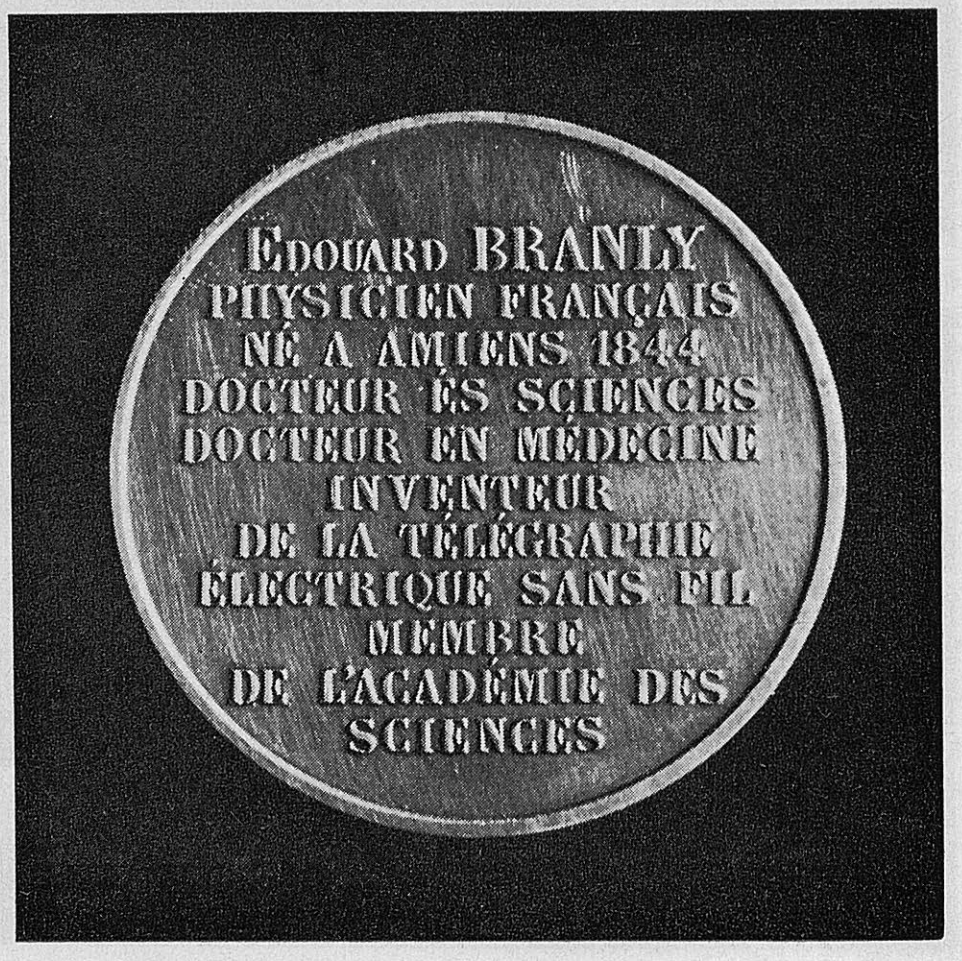
Fig. 3.

Pictures of the lines of flux around an oscillating dipole from the original paper of Heinrich Hertz

The famous German physicist, Heinrich Rudolph Hertz (1857-1894), was the first to create, detect and measure electromagnetic waves, and thereby experimentally confirm Maxwell's theory of " ether " waves. In his experiments he showed that these waves were capable of reflection, refraction, polarization, diffraction and interference. They corresponded precisely in their behaviour to waves of light. Hertz produced his waves, soon to be called by others " Hertzian waves " from the sparks of an induction coil, and in order to study some of their properties he employed a zinc mirror. He described one of his experiments, in 1888-1889, as follows:

" The height of the (parabolic) mirror was thus 2 metres, the width of its aperture 1.2 metre and its depth 0.7 metre. The primary oscillator was fixed in the middle of the focal line. The wires which conducted the discharge were led through the mirror; the induction coil and the cells were accordingly placed behind the mirror so as

A commemorative medal of Edouard Branly, struck by the Paris Mint



to be out of the way. If we now investigate the neighbourhood of the oscillator with our conductors, we find that there is no action behind the mirror or at either side of it; but in the direction of the optical axis of the mirror the sparks can be perceived up to a distance of 5-6 metres". The half-wave length of this experiment was about 30 cm.

Hertz's experiments were half a century in advance of his time, and belong to the field we now call microwave optics.

The next most important event was a lecture given to the Royal Institution in London by Oliver Joseph Lodge (1851-1940) on 1 June, 1894; it was called " The work of Hertz and some of his successors." Lodge, Professor of Physics at the new University of Liverpool, was the first to comment on the phenomenon of resonance or tuning. In 1898 he took out a patent on an adjustable inductance coil in the antenna circuit of a wireless transmitter or receiver, or in both, in order to tune one with the other. His sharply tuned resonance circuits were a substantial advance over Hertz's relatively primitive arrangements.

Alexander Stepanovitch Popoff (1859-1906) was one of many who read Lodge's lecture and was inspired by it. Popoff, a lecturer in physics at the Russian Imperial Navy's Torpedo School at Kronstadt near St. Petersburg, set up a receiver with a protruding wire in 1895, and read a paper, " On the relation of metallic powders to electric oscillations," at the Meeting of the Russian Physico-Chemical Society on 25 April, 1895. By means of this equipment, Popoff could register electrical disturbances, including atmospheric ones.

A more complete description of his experiments appeared in January 1896, and on 12 March of the same year he gave a further demonstration before the same society. Only a very brief minute appeared at the time in the records of the society: " A. S. Popoff shows instruments for the lecture demonstration of the experiments of Hertz. A description of their design is already in the *Zh.R.F.-Kh. Obshchestva.*" At that meeting the words " Heinrich Hertz " were transmitted by wireless telegraphy in Morse Code and similarly received before a distinguished scientific audience.

In view of the date of Marconi's first patent (it was applied for on 2 June, 1896, the specification was completed on 2 March, 1897, and it was accepted on 2 July, 1897) there has in recent years been much discussion about the priority of the invention of radio.

Most historians of science and technology take the view nowadays that, given the right preliminary stimulus —here the work of Hertz and the lecture by Lodge—and the availability of the right materials and equipment, then a given invention might well be made simultaneously by more than one research worker. It is not only the act of invention that counts in technology, but also the successful communication of the idea, so that it can be applied and brought to fruition. There can be no doubt that in the case of radio Marconi invented a system of highly successful wireless telegraphy, and that he personally inspired and supervised its application until it spanned the world.

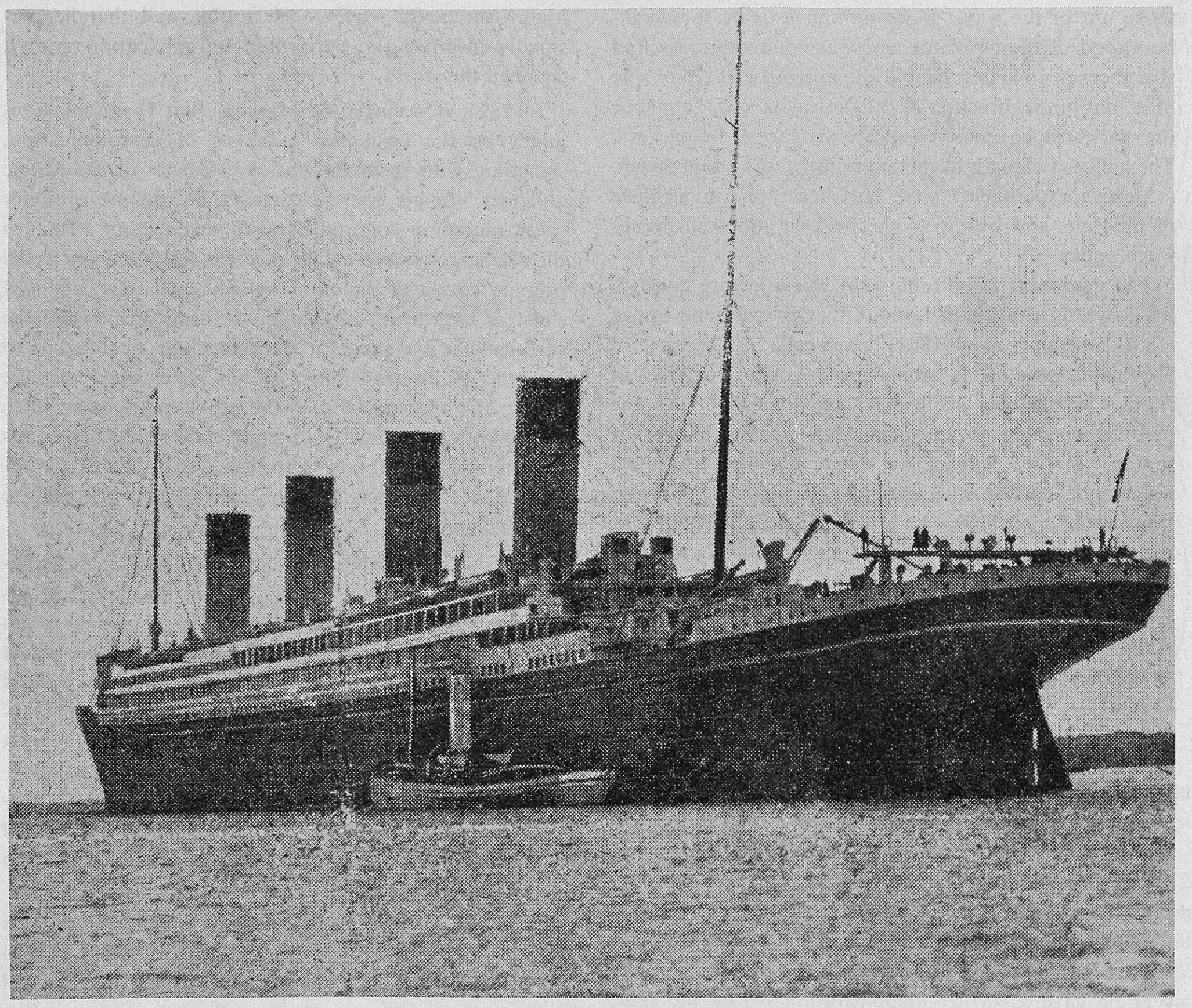
In 1894, it occurred to Marconi that Hertzian waves might be the basis for a means of communication, signalling with them the dots and dashes of the Morse alphabet. In his first experiments, he used an ordinary spark induction coil and home-made coherers. To turn the discharge on and off, he placed a telegraph key in the primary circuit of the induction coil, and thus produced short or long trains of sparks. In order to increase the performance and range of his transmitter, he attached to one end of his transmitter circuit an elevated metallic object, the antenna, and to the other end a metal plate buried in the ground. He could now signal across his garden, and soon found that there was a direct relationship between the height of the antenna and the distance of transmission.

Marconi made important improvements in the components of his system, particularly in the design of his coherers. He also put a relay in series with it, which actuated the tapper of his coherers, and worked a telegraphic printing instrument to record the received signals. And here is perhaps the best place in our story to pay tribute to Edouard Branly (1844-1940), a great French physicist, officially described in France as *inventeur de la télégraphie électrique sans fil.* His great contribution was the discovery of the coherer, that small fragile glass tube, looking like a thermometer, but filled with metal powder.

Branly found that electromagnetic waves, produced as much as 25 metres away from it, caused the individual metal particles in his coherer, first iron and later nickel and silver, to cohere and thus allow the passage of a current through them. A galvanometer was the instrument he used to show this effect; Marconi improved this greatly by using a telegraph printer. But the metal particles had to be separated again, and therefore an electric tapper, a tiny hammer precisely like that used in any electrical bell was added to the coherer. When it struck the glass tube it decohered the particles again, and thus stopped the current from the batteries.

Each successive impulse reaching Marconi's antenna produced the same phenomena in the coherer, first the coherence of the particles, then their decoherence, and hence the recording of the dots and dashes. Marconi used tightly fitting silver plugs in his glass tube, which he evacuated and sealed and thus the coherer became the first of many sensitive devices to receive wireless telegraphy. Before Marconi left Italy, to continue his work in England, he had reached a transmission distance of the order of 1 kilometre.

The story of wireless telegraphy is one of inventors working with each other's equipment, adding new ideas and new improvements to them—a patient, persistent inquiry into natural laws.



Wireless grows up at Sea

The very nature of radio made it international, right from its beginnings. Unlike the cables of the telephone or the wires of the telegraph, electromagnetic waves know no man-made frontiers; once emitted from their antenna, only their strength decides to what distance they travel. This immense advantage was first appreciated by naval and maritime authorities, who had in wireless the first possible method of keeping in touch with ships at sea.

The American liner *St. Paul* was apparently the first vessel to have a floating wireless station aboard and in November of 1899, eastbound to Southampton, she received a wireless message from The Needles, Isle of Wight, when still 105 kilometres out. The next ship to be fitted was a German one, *Kaiser Wilhelm der Grosse*, early in 1900, and from then on ship after ship followed suit, until today it is unthinkable to have anything afloat, from the largest liners to the smallest life-raft, which is not fitted with wireless apparatus.

Wireless first proved its value to mankind on 23 January, 1900, when a small group of fishermen near the Island of Hogland in the Baltic Sea was saved by a radio call to the icebreaker *Yermak*. Marconi had just flashed the letter S, three dots in Morse Code, from Cornwall to Newfoundland, a distance of 3500 kilometres. But this needed high and complicated aerials. The majority of ships fitted with wireless could during these first years just keep contact with the shore for the first few hundred kilometres and resume contact only when they approached the end of their voyage. Also, wireless was then thought of purely as means of point to point communications, a shipowner giving instructions to his captain, a financier ordering his broker to buy or sell, or the transmission of the latest news to the ship's passengers; often this was duplicated on board, and thus the first ship's newspapers came into being. Then, dramatic events happened at sea, which showed to the whole world the real value of this new means of communication.

At 5.30 in the morning of 23 January, 1909, the 15 000-ton ship *Republic* was in deep fog, about 280 km east of Ambrose light, off the East Coast of the United States. There and then she struck the Italian steamer *Florida*,

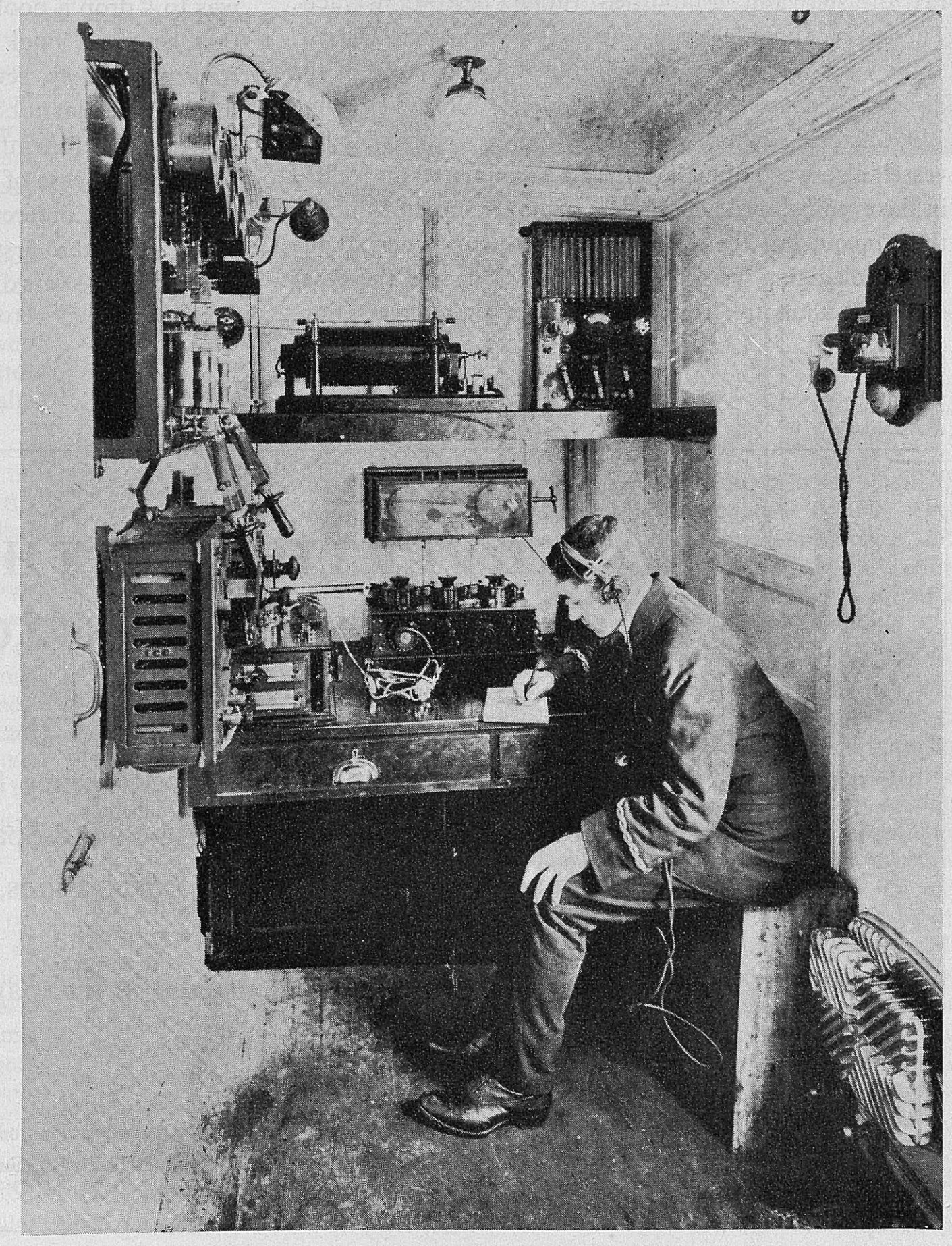
with 800 emigrants aboard, westward bound to the new world. Jack Binns, radio officer aboard the *Republic*, got the wireless distress signal—C Q D—to Siasconset, on the American coast, and from there it was relayed to other ships in the neighbourhood. The first to arrive at the scene was the *Baltic*, which had received the request for assistance only 30 minutes after it had been sent out. She was brought alongside entirely by wireless messages from the *Republic*, this being the only means of guiding her in the thick fog. All 1700 souls from the two ships were saved. For the first time the whole world had known and participated in a major tragedy at sea, and was able to follow in its newspapers the efforts made for rescue operations. Without wireless, no help could have been summoned, nor would anyone have known the disaster.

But the most dramatic event of early wireless history at sea was the loss of the *Titanic* with 1503 souls, including her wireless operator J. G. Phillips. She struck an iceberg on 14 April, 1912, when on a northern great-circle route to beat the record of an Atlantic crossing during her maiden voyage. Here are some extracts from the wireless log of the *Carpathia*, one of the rescue ships; it was kept by Cottam, her wireless operator.

New York Time—Sunday, 14 April 1912

5.30 p.m.	Signals exchange with *Titanic* at frequent intervals until 9.45 p.m.
11.20 p.m.	Hear *Titanic* calling S O S and C Q D. Answer him immediately. *Titanic* says: " Struck iceberg, come to our assistance at once. Position: Lat.41.46 N; Long.50.14 W. " Informed bridge at once.
11.30 p.m.	Course altered; proceeding to the scene of the disaster.
11.45 p.m.	*Olympic* working the *Titanic*. *Titanic* says weather is clear and calm. Engine room getting flooded.

◄ *The S.S.* Titanic *sailing on her first and last voyage, 1912. The heavy loss of life occasioned by her sinking might have been even greater but for her wireless.*



► *A typical wireless telegraphy installation aboard a ship of 1912 similar to the one aboard the* Titanic.

Monday, 15 April 1912

00.10 a.m. *Titanic* calling C Q D. His power appears to be greatly reduced.

00.20 a.m. *Titanic* apparently adjusting spark gap. He is sending " V ". Signals very broken.

00.25 a.m. Calling *Titanic*. No response.

00.28 a.m. *Titanic* calls C Q D; his signals blurred and end abruptly.

00.30 a.m. Calling *Titanic* at frequent intervals, keeping close watch for him, but nothing further heard.

01.25 a.m. Called *Titanic* and told we are firing rockets. No signs of any response.

01.30 a.m. Continue to call *Titanic* at frequent intervals but without success.

At day break the *Carpathia* arrived at the scene of the disaster; she was able to rescue 710 survivors. A Special Committee of the US Congress and a special commission presided over by Lord Mersey in England investigated the disaster and established rather perturbing facts. There were some bitter lessons drawn from that disaster. Ships were within radio reach, but did not know of the disaster, because they had no wireless. More distressing still was the story of the *California*, a small passenger vessel, also westbound. She had encountered an icefield in the evening, and her wireless operator sought to notify the *Titanic*; but the operator of the luxury liner, at the time exchanging messages with Cape Cod, told the other ship to " shut up, " and keep out of the conversation.

The operator on the *California* listened for a few more minutes to the messages passing and then went to bed, having been on duty for 16 hours. The *California* was less than 31 kilometres away, although observers from the *Titanic* thought the distance was only about 10 kilometres. When later in the night officers of the *California* saw white rockets in the distance, they never thought of waking up their wireless operator; only when he resumed his duty at 04.00 a.m. did he learn of the awful disaster.

Of course, this kind of thing was nothing new. As more and more ships had become equipped with wireless, trouble had begun. To the operators, the thing was a new toy, and they had endless fun with their " Rock-crushers " as the spark sets of the early days were called. At first there were no international regulations in force, and every operator did pretty well as he pleased.

Because the spark sets used a very wide bandwidth, two chatting operators practically blanketed any other vessel within 100 kilometres that might have wanted to use the air. The only way to choke them off, and it was frequently used by some who wanted to send a message, was to " drop a book on the key. " This meant literally that he put a book or any other heavy object on the transmitting key, setting up such a continuous roar of interference that nobody could hear or send anything at all.

The need for international regulations arose much earlier in the case of radio than for telegraphy. The first preliminary Conference was called for 1903, only two years after the first transatlantic wireless signal had astonished the world.

(Original language: English)

ADVERTISE IN THE TELECOMMUNICATION JOURNAL !

The *Telecommunication Journal* is the official organ of the International Telecommunication Union, the United Nations specialized agency for telecommunications. It appears once a month in separate English, French and Spanish editions. It is read by the senior officials and directors of all major organizations, both governmental and private, which operate telecommunication services, and it is a unique medium of publicity for the manufacturers of equipment used in the management and operation of such services.

For further information on advertising in the Telecommunication Journal, contact Annonces-Service Post S.A., Wydäckerring 140, 8047 Zurich (Switzerland)

telepersonality

53 – JACQUES MARETTE

MORE THAN FOUR HUNDRED years ago, the great French poet Joachim du Bellay wrote of his native country as the *mère des arts, des armes et des lois* and the world since has never ceased to wonder at the constant, unflagging inventiveness of the French spirit in all domains of human thought and enterprise. In diplomacy, for example, France has so often led the field that for many generations French was virtually the only language of the diplomatic world. This is a well-known fact. What is less well-known is the initiative of France in the creation of the modern multilateral system of international co-operation. For it was in response to the invitation of the Government of Napoleon III one hundred years ago that twenty states met in Paris and founded the first of the international organizations now specialized agencies of the United Nations.

One of the members of the French delegation at the Paris meeting was the Vicomte de Vougy, the Director-General of the Telegraph Lines of France, who was elected Chairman of the Committee of Special Delegates which actually drew up the draft Convention.

The Vicomte's successor to-day is no longer a Director-General but the Minister of Posts and Telecommunications of France, Mr. Jacques Marette. Times have changed in other ways too. To-day, the Minister stands at the head of an extremely complex organization of more than 300 000 people and administers a budget of 8618 million francs. He is ultimately responsible, among other things, for the good humour of 2 800 000 telephone subscribers—an important, by definition vocal and often highly criticas segment of the population.

Mr. Marette himself is young for the immensely important post that he occupies, having been born in Paris on 21 September 1922. He is not an engineer by training, but a lawyer, though he also holds a diploma for higher economic studies from the *Ecole des sciences politiques*. He is the possessor of the *Croix de guerre* and the *Médaille de la Résistance*.

From 1945 to 1948 he was a journalist, and then, until 1958, a company director. He was elected a Municipal Councillor of Paris and General Councillor for the Department of the Seine in March 1959, resigning these positions later in the same year when he was elected Senator for the Seine.

It was on 15 April 1962, before he was yet forty, that he was appointed Minister of Posts and Telecommunications. He was elected deputy for the 15th *arrondissement* of Paris in November of that year, but, having been subsequently confirmed in his Ministerial post, he resigned his seat in accordance with French law to his alternate.

On 17 December 1964 he paid his first official visit to Union headquarters. From this visit it was possible to gain the impression of a man fully at ease with himself and all those he encounters, calm, quietly authoritative and as much in command of a situation as of his facts. He listens courteously, patiently, and the occasional incisive question that he poses is timed to get the maximum of information in the shortest possible way. His mind, in fact, is clearly the well-regulated precision instrument of the great French schools, flexible where necessary but primed with hard facts. If he imposes his personality, it is effortlessly and agreeably and with no air of superiority.

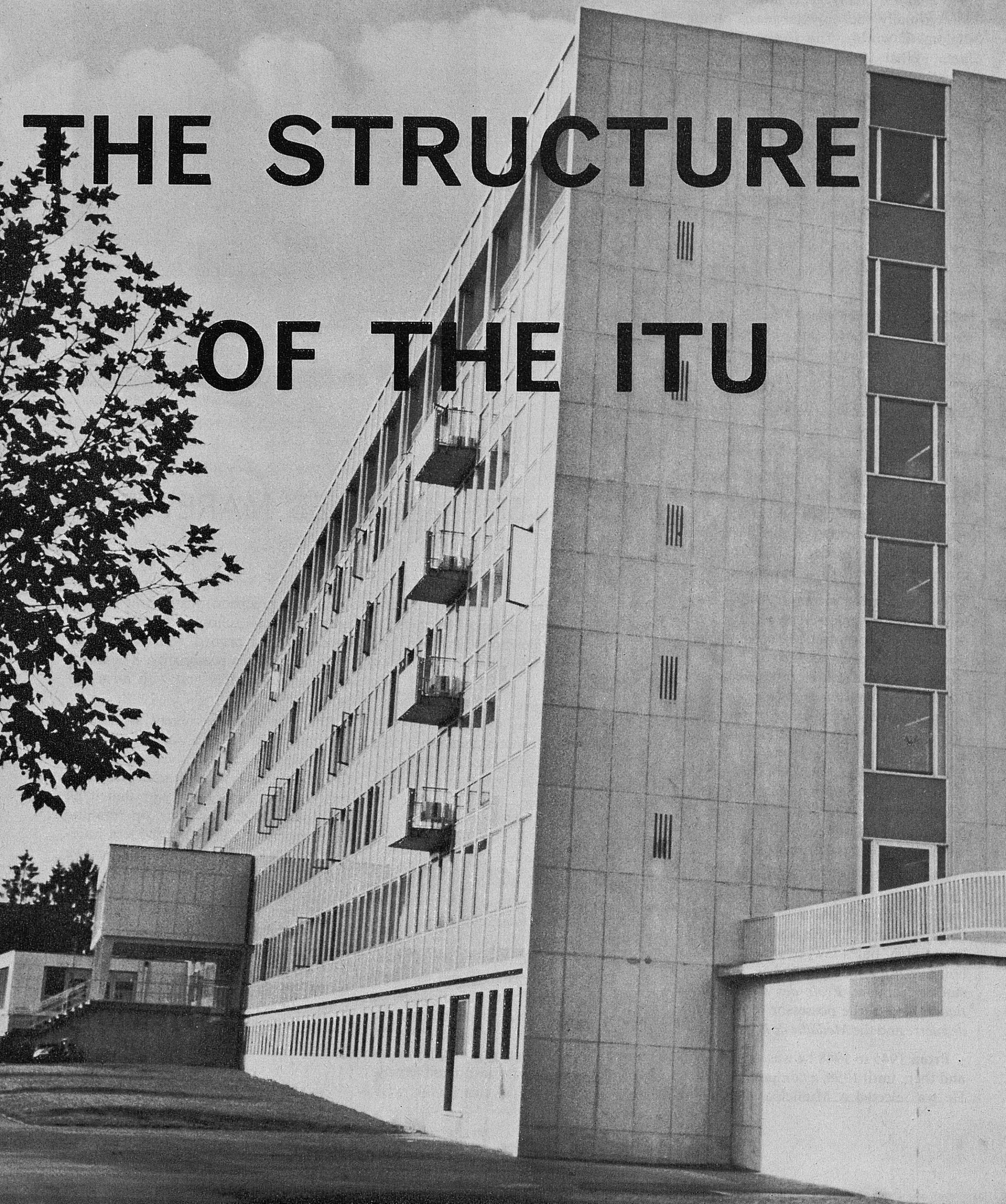
The French Government is inviting the Administrative Council to Paris on 17 May to celebrate the signing of the first Convention in the same city and on the same day of the year that it all took place a century ago. In recalling the origin of the ITU and modern international co-operation in this evocative way, France is paying tribute not only to the collective Membership of the Union but also, even if unconsciously, to its own sense of historical initiative. The *Telecommunication Journal* joins in this tribute in its own way, not least by this brief acknowledgment of the personality of France's outstanding young Minister of Posts and Telecommunications.

C.M.

(Original language: English)

A further contribution to the discussion on

THE STRUCTURE OF THE ITU



IT IS NOT SURPRISING THAT, in the period preceding the Plenipotentiary Conference, to be held in September, a lively interest should be shown in the structure of the ITU. It is assumed that the conference will review past experience, consider the purposes of the Union and then decide how its structure can best be adapted to serve them.

The Post and Telecommunications Administrations are preparing for the conference in their respective countries, but the preliminary discussion has already gone beyond national level. The *Telecommunication Journal* is publishing articles expressing varying opinions on the Union's structure by persons who have long been closely involved in ITU activities and who occupy very high administrative posts.

Readers of the Journal will perhaps accept some thoughts on the Union's structure which are the result of a different kind of personal experience. As a member of his country's delegation for close on thirty years, the author of this article has attended various meetings organized by the ITU—Administrative Conferences, CCI plenary assemblies, study groups, Provisional Frequency Board (PFB), working parties and Plan committees—and has been responsible for certain CCI documents. Two years' direct contact with African countries as a regional expert for that continent has given him some insight into their problems and needs. He also heard their grievances, their

by

Dr. W. J. FIJALKOWSKI

Project Manager
ITU — Special Fund Project
in Algeria

views on the assistance offered by the ITU and how they hoped to benefit from it. He is now supervising a Special Fund project to set up a Telecommunication School in Algeria, and what he has learned of the difficulties with which that particular region is faced has merely confirmed his views on the problem of Africa as a whole. As he has never occupied an administrative post in the ITU, he is perhaps in a better position to examine the Union's structure objectively, or at least to examine the advantages which membership of the Union brings.

Like any personal comment, the article is doubtless incomplete, but the author hopes he may contribute some useful and constructive ideas to the discussion.

Changes and their effects

In this chapter I shall review some obvious and well-known facts which, nevertheless, we would do well to recall. The ITU of 1965 is not the same organization and does not operate in the same conditions as the ITU of 1955— far less of 1945 or 1935.

Changes, modest in their proportions as in their repercussions, occur steadily day by day, until at a certain moment one realizes that the organization and conditions of work have undergone a fundamental change. Let us review briefly the period covering approximately the last ten years.

1. Telecommunication belongs to those fields of human endeavour which, scientifically, technically, organizationally and in scope, are developing most rapidly to-day.

It is telecommunication, moreover, which furnishes the essential prerequisites for the recent great achievements of our time: automation of productive processes and administrative procedures, space travel and space research.

Certain developments in telecommunication during this period are undoubtedly worthy of mention:

— the birth and development of two new large and important telecommunication systems: data transmission and space communication

— the constant and rapid increase in the number of telephone and telegraph subscribers and the volume of traffic

— the progress in long-distance transmission, which has given us services of impeccable quality and has greatly intensified traffic between continents. With the new large-capacity submarine cables, space communication; improvements in HF transmission and beaming technique, the popularization and improvement of error-correction technique, we already have the basis of a worldwide network for telephony, telegraphy, data transmission and the exchange of sound and visual programmes, fully compatible with automatic switching

— television networks and receivers now cover the world; we appear to be entering the era of colour television.

2. On the one hand, we find a multitude and diversity of services offered, a veritable complexity of technique, which might give the impression that telecommunications are dividing increasingly into separate fields, with consequent repercussions on the nature of ITU activity. On the other hand, the basic elements of networks are so designed that they can be used for all types of services, while electronics have invaded all new equipment systems. The uniformity of equipment, which is the result of large-capacity circuit groups, and the need for economic maintenance and better quality, mean that, more than ever before, the transmission of information constitutes one indivisible field. The differences which separated telephony and telegraphy, for example, or wire and radio transmission, are disappearing. In the ITU, this process led to the fusion of the International Telephone Consultative Committee (CCIF) and the International Telegraph Consultative Committee (CCIT) into the International

Telegraph and Telephone Consultative Committee (CCITT).

3. The nature of the activities of the permanent organs and their specialized secretariats have changed noticeably with time. From co-ordinating recommendations, technical solutions and the administrative rules of Member countries, they have reached the stage of preparing jointly the most appropriate solutions to problems and laying down avenues of development which Members feel obliged to follow. The Consultative Committees and the International Frequency Registration Board (IFRB) have an increasing need of specialized staff for work which far exceeds administration and belongs to the realm of study and research.

To expedite its work, economize staff and deal with difficult questions, an electronic computer was installed in ITU headquarters.

4. The ITU agreed to take part in the United Nations Expanded Programme of Technical Assistance (EPTA) and Special Fund; this work has assumed considerable proportions and has increased each year. Assistance is given by creating training and study centres, by carrying out preparatory studies for development projects, by providing Administrations with teachers and experts in general and specialized fields, and by sending regional experts to all continents. The work performed at the request of the United Nations represents an important part of ITU activity as a whole. A responsibility of the General Secretariat, it has introduced an element of technical specialization into the nature of this permanent organ, which originally was a representative, administrative and co-ordinating body.

In the decisions and resolutions adopted by ITU organs, one can see that determined efforts have been made, with varying success, to lessen the gulf between the developed and the less developed countries by directing activity towards those areas which stand in greatest need of the benefits of co-operation. Continuing this trend, the ITU could be, in the field of telecommunication, a driving force in ensuring that the countries which waited so long for political independence are compensated for former political injustices.

With its own resources and within the framework of existing permanent organizations, the ITU furnishes assistance to countries which need help in telecommunication. It organizes seminars, gives advice, makes recommendations and adapts its study and documentation programmes to the needs of such assistance.

5. The composition of the Union, its sphere of action and its working methods have been fundamentally modified by the following:

— the political change that the world has undergone, the accession to independence of many countries, have doubled the Union's membership

— the greater part of the world, which formerly lived in the shadow of colonialism, has emerged to swell the international community

— the principle of full and equal participation of all Members in the activities and organs of the Union, including the Consultative Committees, has been accepted

— the multitude, complexity and urgency of the problems dealt with have caused the number of meetings organized by the Union to increase year by year.

6. The Union has been transformed from an instrument created to further international collaboration in order to build communications on a world scale, through agreements on operation and technical principles, into an organization which, to some extent, determines the main lines of development of the world's telecommunication system.

Objects of the Union and means of achieving them

It might be claimed that the Union's role remains the same, but one could argue equally well that its aims are constantly changing. These statements seem contradictory, but they are only apparently so. If the Union's purpose is defined in general terms, we can see that the changes occur in the ways and means by which it works to attain that purpose.

Leaving aside the texts of the Convention, which inevitably are couched in legal language and thus tend to be cautious and unimaginative, the general objectives of the Union, which induced P&T Administrations to unite in an international organization, may be defined as follows:

The countries which set up the ITU and have guided its activities for a number of years developed their national telecommunication systems according to different principles, dictated mainly by the paths taken by their respective industries. They soon realized that, to establish and operate international communications, they had to agree on the principles of collaboration. The growing number of international circuits over the years led to the establishment of an international network, the parts of which had to function harmoniously. Agreements on individual intercommunications were not enough. The creation of an international body became imperative and the Union came into being. From that moment, it was possible to meet regularly, to exchange views and information and to agree on the action required to ensure the essential minimum of standardization in technique, in modes of operation and in the tariffs to be applied.

The most tangible achievements of the ITU are:

— the Telephone, Telegraph and Radio Regulations

— the recommendations of the International Consultative Committees and Administrative Conferences

— co-ordination of the assignment and use of frequencies.

In addition to these results, which are evident from the number and volume of documents published by the ITU for the benefit of its Members, there are others which are no less important. By frequent and regular meetings between representatives of different countries and from different specialities, by disseminating documents setting forth the views of the different Administrations on technique, organization and economic questions, while keeping abreast of the latest developments, international collaboration between Administrations was initiated and was fostered by mutual understanding and knowledge. The permanent organs of the Union play an increasingly important part in international activity; they co-ordinate and encourage the move towards unity in technique and operating methods. Agreements on the problems of the moment, which are difficult to arrive at, are made easier and more effective when such matters are dealt with at the outset. To maintain the most favourable and appropriate conditions for the development of telecommunications throughout the world has become the aim of the Union.

The state of advancement of telecommunication differs widely from one Member country to another. These differences can be gauged from the size and density of networks, the number of subscribers, the quantity and quality of services, and from all basic factors such as the number and proficiency of skilled staff, the existence and size of research and planning centres, and the capacity of the equipment manufacturing industry, viewed against the background of the state of the economy and the intensity of social life. One may talk of relative and absolute backwardness or advancement in terms of the degree to which telecommunications cater for needs.

Apart from their efforts to help the less developed countries overcome the backwardness which is the heritage of their former political dependence, the most developed countries have a direct interest in levelling out these differences. We are on the point of achieving a world network but this cannot function satisfactorily unless all participating countries have properly developed networks providing services of the high quality required. The ITU, which has to see to the development of technical means throughout the world and to co-ordinate national efforts towards these common ends, has the opportunity, by carefully considered activity and with an appropriate structure, to give direct assistance or to stimulate the creation of the necessary conditions.

In which sphere of activity can the ITU be effective, and in which spheres is its influence strictly limited? The ITU can act directly and very effectively by:

— the joint planning of networks and participation in agreements on construction systems and conditions
— action to promote the uniformity of systems and to remove obstacles in the path of international collaboration
— co-ordinating agreements on tariffs, operating procedures and maintenance principles
— issuing recommendations on the most advisable methods and solutions
— co-ordinating the use of frequencies
— assembling and publishing world statistics
— co-ordinating the basic and further training of specialists
— sending experts to countries and regions
— helping to set up study, research and staff training centres, using the resources provided by the United Nations
— making studies of special cases.

The ITU can indirectly further appreciation of the importance of telecommunications and stimulate interest in their development by active publicity and by influencing national financial circles.

Everything the ITU does will depend to a great extent on its structure. It would be unjust to deny that it has already accomplished a great deal, but it would be unreasonable to claim that it could not do more.

From the long list of ITU activities, I have selected certain items which appear to have been somewhat neglected in the past:

— technical functions, advice and studies regarding particular problems at the request of one or more countries, information about telecommunication
— basic and further training of specialists
— perhaps the most important, ensuring that all Members have a fair share of the advantages of belonging to the Union.

These problems, and the way in which they are affected by the structure of the Union, will be discussed in greater detail.

Technical functions

In the June 1964 issue of the *Telecommunication Journal*, Mr. John H. Gayer analyzes the work of the IFRB and draws certain conclusions on the way in which it should be organized. He says:

> " *Therefore, it is clear that we have a situation in which on the one hand a great mass of information must be processed on a routine basis, while on the other individualism of a high order is demanded... these functions lend themselves to clear division.* "

He finds that the same diversity of activity exists in the other permanent organs.

As in the case of the IFRB, the work of the International Consultative Committees and the Department of Technical Co-operation is becoming increasingly technical. I use the term " technical " to preserve the continuity of subjects dealt with by Mr. Gayer, although it may not be quite accurate. Perhaps I may define it more specifically as follows:

We shall call " technical " those activities of the Union which do not follow a well-established procedure and which, by their special nature, call for highly-qualified staff, i.e. persons with a thorough grounding in modern

technique and in the theory of the subjects dealt with as well as sound practical experience. The staff's qualifications are only part of the prerequisites for the proper accomplishment of technical work. Such specialists must be research workers and scientists, who examine the problems entrusted to them, who assemble and analyze data. If necessary, they must widen and deepen their knowledge and, finally, draw conclusions. These research workers must be able to present their conclusions in suitable written form.

The permanent organs find themselves more and more obliged to go beyond their primary roles, to express themselves in principle in terms of administrative co-ordination and increasingly perform technical functions. They must deal with questions raised by one or more Administrations, lead discussions and take an active part in them, initiate and promote studies and sometimes carry out studies themselves.

We are all aware that requests for assistance from various countries have not always been met because of defects in the present structure of the Union. The fate of questions and requests submitted by the developing countries and incorporated in study programmes depends on their happening to arouse the interest of another ITU Member, and for the present the role of the permanent organs can be merely one of administrative co-ordination and mediation.

Let us consider some specific examples:

Under the Expanded Programme of Technical Assistance, the ITU sends out a number of experts, who are selected with great care and who have broad experience and excellent qualifications. Nevertheless, to evaluate the result of their work, to profit from their conclusions, and to deal with the problems which are within the field of a single expert, those problems have to be studied, not from the administrative standpoint alone, but thoroughly; further studies have to be undertaken and lessons drawn from the sum of experience of the various experts. To direct the work of the experts properly and to serve Administrations, continuing studies are required.

The management of Special Fund telecommunication projects may thus be taken as an example of the need for " technical functions " in the ITU. Most of these projects relate to staff training and scientific studies. The importance of the obligations imposed and sums involved implies heavy responsibilities for the executing organ which are not limited to financial management and administration. The substantive management of projects calls for regular studies of new teaching methods and curricula, of the organization of schools and research centres and of the state of the equipment market; experience acquired must be synthesized and applied.

It is customary for the CCI plenary assemblies to incorporate quite willingly in their study programmes almost all of the questions proposed by individual Administrations, particularly when they are submitted by developing countries. But inclusion of a question in the programme does not necessarily mean that the study will be made, at least to the extent desired and within a reasonable time. What happens to the question depends on whether another Administration is directly interested in it or feels disposed to lend assistance to the country concerned. The specialized secretariat, as organized at present, assigned an administrative role and limited in its freedom to express an opinion by the fear of being suspected of bias, is helpless to assist.

All of the permanent organs of the Union have " technical functions ", and these still need to be widened much further. This leads me to think that at least part of those " technical functions " should be entrusted to a single organization, such as an International Institute or Centre of Telecommunication Study and Research. The funds for setting up and running this institute would be provided from the ITU budget, with assistance, of course, from the United Nations EPTA and Special Fund. Such an institute would be in a better position to meet the needs of ITU Members. It would relieve the permanent organs of their " technical functions ", with consequent savings in their budgets, and would clarify the structure of the ITU.

In considering the merits of an International Telecommunication Institute, certain questions should be answered, e.g. is there any reason why the two International Consultative Committees should remain separate entities when telecommunications are moving towards a unified world network? In his article, Mr. J. H. Gayer writes " *. . . it is evident that the CCIR and the CCITT. . . should . . . remain distinct from one another. . .* ", but he does not substantiate his view. The dividing lines between the permanent organs are not easy to draw, and in the same article Mr. Gayer observes: " *The IFRB has accumulated over the years some scientific functions which should be a part of the CCIR.* " The proper division of studies between the IFRB and the CCIR, and even more between the CCITT and the CCIR, is not an easy matter. Scientific questions are more appropriate for an institute than for an administrative organ.

With regard to the exchange of information on the various aspects of telecommunication, and the impact of such exchanges on the rate of development, the ITU performs most valuable work, but a little reflection on the subject leads to the conclusion that there could be slightly better organization and programming in future.

On the one hand, the ITU acts as intermediary and co-ordinator in the exchange of information and, on the other hand, through various activities, it encourages countries to improve contact and to co-operate with each other. The ways and means employed for the exchange and dissemination of information are:

— the publication of statistics on the number and types of equipment used, on the composition and capacity of existing and planned networks, and on the volume of traffic

— the issue of recommendations, supporting documents, standards and reports

— the distribution of working documents of the various CCI study groups and working parties, and of specialized conferences and meetings

— the exchange of views by delegates at meetings in private conversation

— the organization of informatory meetings and seminars.

With regard to the third point, it is reasonable to suggest that the dissemination of documents could be better organized. During my visits to various countries, I discovered that those which are not in a position to participate in CCI activities do not receive their documents. For example, an African country did not receive the documents of the meeting of the Plan Sub-Committee for Africa, held in Dakar in 1962, because it was not represented at the meeting.

The IFRB, which has a bigger staff than the other permanent organs, has organized seminars on frequency distribution most successfully, but the number of informatory conferences and seminars is by no means sufficient in any field.

While part of the Union's work in the exchange of information is a by-product of other activities, as can be seen from the above-mentioned list of ways and means, the publication of statistics is a form of direct action. These statistics vary considerably in completeness of coverage and thoroughness of detail because they originated at different periods. Sending questionnaires to Administrations and compiling summaries of their replies is an administrative job, but the programming of statistics and the analysis of data is creative, technical work. Statistics programming, which is akin to scientific study, could be entrusted to the international institute envisaged above.

Training

Of the three conditions required for the rapid development of a telecommunication network, namely, planning, financial and technical means, and executive and operating staff, it is the last which presents the greatest difficulty. There is no doubt that investment in telecommunication brings in a good return, as can be seen directly in the operating Administrations' revenue and indirectly from the general economic, administrative and cultural benefits. This return makes the financial effort of the country concerned fully justified and serves to attract foreign capital, if necessary.

Projects can only be prepared by highly-qualified specialists. Adequate international assistance in this respect is relatively easy to arrange. But it is impossible to decide whether a project is adapted to a country's needs, and then to execute it and operate the network, unless sufficient specialized staff is available nationally to do the main share of the work involved. It is on this point that developing countries encounter difficulties which cannot be overcome within a short space of time.

In countries where telecommunications are least developed, the possibilities of finding suitable staff and students are limited by the very low level of general education and of school attendance, for there are just not enough suitable schools. The solution of these problems requires resources and time, and time cannot be created, it has to be saved. It is possible, by close, well-organized international collaboration, to save time for training staff.

Specialized staff can be divided into three categories according to the extent and level of qualifications required. Each category presents distinct problems in the training, advanced training and the forms of international collaboration it demands.

The first category consists of the technicians on the job: fitters and mechanics for the installation, maintenance and repair of equipment. They are the most numerous. If the service is efficiently organized, and if operating and maintenance methods are simplified and standardized, staff requirements can be reduced and qualifications need not be so high. Fitters and mechanics can be trained in large schools. Time and costs can be cut by adopting modern educational methods and by organizing training on the lines followed in big industries.

The second category comprises the supervisory technical staff, who need a long period of training. After secondary school, they must study the science of telecommunication at university level. As they are required in smaller numbers, it is sometimes possible to reduce the training period by recruiting engineers from other fields, for example, and giving them special courses. Young graduates, however, always need practical experience on the job and continual further training.

The third category consists of telecommunication directors. It is they who decide which systems should be adopted, brief the planners and approve the development projects. This category, which in principle is recruited from the second, can never be sufficiently qualified unless such directors enrich their knowledge by taking part in studies and research for a fairly long time; and if they cannot remain active research workers, they must keep up-to-date with telecommunication progress, for example, by participating from time to time in studies and research.

Training and advanced training are not foreign to the activities of the ITU. It facilitates the training of mechanics and fitters by sending teachers and project directors, by purchasing teaching equipment and by granting scholarships. It contributes to the training of senior technicians and directors by helping to set up research centres, by organizing seminars and by means of fellowships. The latter two categories of staff improve their qualifications indirectly through their contacts with specialists from other countries, some of whom are eminent men. It is a pity, however, that, with the present structure of the ITU, organized activity is limited to what can be done with the funds provided by the United Nations or through the voluntary co-operation of countries.

There is some lack of balance between the facilities offered a Member when seeking information, advice or a recommendation on technical and operational matters as

compared with the response to requests concerning education. The recommendations and reports of the International Consultative Committees and the IFRB already provide answers to many questions, and if a new subject is introduced, the permanent organs are prepared to make a study. Members receive excellent advice and guidance, for instance, on the standards to be met by telephone transmission equipment or on the conditions governing the use of frequencies.

Let us suppose, however, that the ITU is asked one of the following questions:

What level of general education is essential for the discharge of certain technical duties?

What is the best programme of technical studies for certain duties and how should the studies be organized?

What is the standard equipment used for teaching purposes and what are the essential features of such equipment?

What funds are required to set up a school?

What is the Union's opinion on the use of teaching machines in telecommunication schools?

How should service be organized and what type of training is recommended to solve the problem of shortage of staff?

None of these questions are within the scope of the ITU as organized at present, and probably they are never answered, or at least not satisfactorily. Yet immense experience has been accumulated by countries all over the world in the field of education and in solving shortages of specialized staff. If this experience were shared with other countries, if it were made available to all who are interested, an important contribution would be made to the improvement of telecommunication. The ITU cannot stand aside in this matter. It must co-ordinate and promote international collaboration in training essential staff.

Several of the countries I have visited as regional expert are not in a position to overcome their educational difficulties by themselves. Their economic position does not permit them to create training centres without weighing costs against returns. Small schools providing an adequate standard of education would not be economically justified and foreign teaching staff would be essential in the beginning. For such countries, a regional or sub-regional solution, based on international co-operation, would be economical and feasible. The ITU might take as an example the Training Centre for Economists which was set up by African countries in Dakar with assistance from the Economic Commission for Africa (ECA).

The developing countries sometimes receive considerable help with their education programme from the more developed countries. These far-off countries, living in quite different geographical, economic and social conditions, grant fellowships, send teachers, organize studies; but as a rule they simply transplant their own methods. The receiving countries have to assimilate those methods and fit them to their own purposes, either by themselves or through regional co-operation based on the fact that neighbouring countries in the same region face similar conditions. Even European teachers who come to Africa under bilateral agreements show a keen interest in the experience of neighbouring countries, and stress the desirability of common curricula, organization and methods as well as textbooks.

By organizing regional and sub-regional conferences on education and the problems of obtaining specialized staff, the ITU would make a practical contribution to international collaboration in these fields.

The need for directorial staff constantly to enrich their knowledge by taking part in studies, research and planning has already been mentioned. Some countries, however, have no study centre and are obliged to send their staff to other countries, which may be far away and where the research programmes often have little in common with their problems. The result is that the fruit of the students' work remains in the countries which grant the fellowships, as the subjects of advanced training are far removed from the home countries' requirements. Until such time as the less developed countries are able to establish their own study centres, the best course would be to set up regional and sub-regional centres where the countries concerned would draw up joint study programmes adapted to their particular needs.

Finally, examination of ITU activities shows that the direct training provided by the permanent organs in the form of seminars is not on a sufficiently broad scale or systematic enough. ITU specialists and regional and country experts should be given the task of organizing seminars and courses at their duty stations or when they travel.

The ITU structure should be adapted to deal with these outstanding problems. Each of the permanent organs could undertake some educational activity, although full co-ordination would present certain difficulties. Another solution would be to entrust the entire question of education to a new permanent organ exclusively concerned with international collaboration in training and solving staffing problems. Alternatively, an education and training department might be included in the international institute proposed in the section on the Union's " technical functions. "

Geographical aspects of the Union's structure

The advantages of membership of the ITU may be classed under two heads: those which are not directly affected by a Member's geographical position and those which diminish with the distance from Union headquarters. It should be realized, however, that when a country is deprived of certain of the

latter benefits, it is unable to take full advantage of the former.

In principle, all Members can benefit equally from the regulations, recommendations and other final documents of the ITU, provided such documents fairly reflect the needs of all countries and provided each country has the skilled staff to make proper use of them.

The supreme organ of the ITU is the Plenipotentiary Conference. As these conferences are held once every five years, distance should not prevent any country from availing itself of its right to attend them.

Matters dealt with by correspondence are to some extent unaffected by geographical position. These include frequency registration, the co-ordination of frequency usage and consultations on specific points carried out by the IFRB.

Anyone who has done so is aware of the advantages of taking part regularly in the work of any of the permanent organs. He knows the value of working party and study group meetings, and the extent to which sound past experience can influence the final decisions of study groups and plenary assemblies. Direct and regular contact is always the true means of exerting influence and of subsequently deriving benefit from the action taken.

Let us consider the cost to countries at varying distances from ITU headquarters, assuming that they take an active part in the Union's work and attend its meetings.

Supposing that twenty meetings are held in the year—this is not an over-estimate as there have been even more in the past—and that each country sends three representatives, the travel expenses of the nearest countries would amount to $3 \times 20 \times 40$ US dollars = \$2400 (average return fare \$40); for countries at a fair distance (return fare \$500) the cost would be about \$30 000, while for the most distant countries it might exceed \$50 000. Very few distant countries can afford this expenditure, and it is clear from the lists of participants in meetings that attendance decreases with distance.

Transferring the Union's headquarters to another part of the world would not remedy this disparity; it would merely change the circle of privileged Members. The organization of meetings outside Geneva helps to correct the anomaly but to a very limited extent. The only course that might be effective would be to decentralize the organization and delegate as much work as possible to regional and sub-regional bodies.

The idea of decentralization, however, while attractive, must be examined with the greatest care, at least so far as its feasibility and possible implications are concerned. We must consider which activities of the permanent organs could be decentralized, and the additional expenses, if any, which would be entailed. The criteria for defining the boundaries between regions and sub-regions are extremely important. And there is the possibility that regionalization, while strengthening the links between the countries concerned, might undermine international co-ordination. In the absence of extensive preparatory studies, it is impossible for one person to deal with all those questions and no answers can therefore be given in this article. Nevertheless, the advantages to be gained from decentralization seem great enough to warrant discussing the problem and some indication of the activities which could be regionalized appears below.

The organization of the Union is based on:

1. the Plenipotentiary Conferences
2. the Administrative Conferences
3. the Administrative Council
4. the permanent organs.

Let us examine more closely the possibilities of regionalization in relation to each of these organs.

The Plenipotentiary Conference, as the supreme organ of the Union, cannot be decentralized in any respect. The same might be said of the ordinary Administrative Conferences, but the Convention already makes provision for special regional administrative conferences as well. If the permanent organs could be decentralized, regional administrative conferences would become more important and would probably be termed " ordinary " instead of " special. "

Conference agendas suffer somewhat from a certain preponderance of the most developed countries, with the result that the interests of those areas receive special attention. If Administrative Conferences were divided into regional and world meetings, the matters dealt with regionally would doubtless be more directly related to participants' interests and world conferences would have less work to do.

The most fruitful subject for thought is the advisability of decentralizing the permanent organs. We have the International Consultative Committees, the IFRB and the General Secretariat, including the Department of Technical Co-operation. The Consultative Committees function like savings banks: the more one puts in, the more one gets out. The most developed countries carry out most of the studies, but it is they, after all, who in return are given the conditions and standards of co-operation required for their highly developed networks (which are often constructed on very different principles) and who receive the guidance and specifications needed by their telecommunication industries.

Countries in other regions are in a different position and need a different kind of collaboration. For countries which do not yet have their own industries, the choice of a system is not a matter of protecting their national systems and techniques or of seeking ways in which different networks can co-operate within existing conditions. They have simply to select the most appropriate system, and there is nothing to prevent the same solution from being applied throughout the region in the interests of simplicity and uniformity. In regional networks which still have to be established, for example, it is a simple matter to select the same signalling systems for all countries and thus avoid the numerous difficulties that arise when different systems are used.

The planning procedures used in the European regional network are not always suited to other regions. European countries developed their domestic networks first, and the

international network was later established on those bases through bilateral and multilateral agreements. Since an international network was created in Europe, great progress has been made in methods of planning national networks (see *National telephone networks for the automatic service*, Geneva, 1964, CCITT). Would it not be possible to adopt at least some of those methods in planning new regional networks?

Countries in different regions are not always interested in the same subjects, and it would be more effective if each region were left to consider its own operational, maintenance and planning problems and co-ordinate their solutions. This would also give some assurance that the interests of the weaker countries were not neglected in favour of those of the stronger. We should not forget that the idea of decentralizing the work of the Consultative Committees is not new; it was put forward, for instance, by the Director of the CCITT at the New Delhi Plenary Assembly in 1960.

The Department of Technical Co-operation, that part of the General Secretariat which is responsible for United Nations EPTA and Special Fund projects, would lend itself very easily to decentralization. It assists in the preparation of the projects, and organizes and supervises their execution. If a co-ordinating body is sited close to the region concerned, requirements are better understood, execution becomes more flexible and resources, which are never sufficient, are used more effectively.

An interesting attempt at regionalization was made last year when posts of regional expert were created for Asia, Africa, Latin America and Central America. It is still too early to assess results, but from personal experience I would suggest that this line of action should be continued.

Taking the field of activity of regional experts as confined to the EPTA, we may define it as follows:

- to advise on, and to amend and co-ordinate, the preparation of programmes by Administrations
- to co-ordinate and supervise execution of the projects
- to provide the kind of technical assistance given by country experts, but in urgent cases only and limiting it to small projects, courses, seminars, advice and expert appraisals
- to promote collaboration between countries in the region, for example, by carrying out studies on the state of their telecommunications, on present and future requirements, on the organization and provision of training and by making the results available to all countries in the region; the expert should contribute to mutual understanding among the countries in his region.

The effectiveness of the assistance given by a regional expert depends upon certain conditions:

- his tasks and programmes of work must be clearly defined
- he must play an active part in the administration of the EPTA and the Special Fund in his region
- he must be allowed some latitude in administrative and budgetary matters
- he should be engaged on a long-term basis.

The first point obviously has no meaning unless the work programmes are drawn up in consultation with the countries concerned and have their full support.

Generally speaking, it is true to say that none of the above-mentioned conditions is met, and it would be unwise to judge of the advisability of creating posts on the basis of results obtained during a period of experiment inadequately prepared.

There remain the IFRB, the Administrative Council and the General Secretariat properly speaking. Suggestions have already been made for the establishment of Regional Frequency Registration Offices which, being closer to users, would be responsible for the first stage of co-ordination. Decentralization of the Administrative Council and the General Secretariat would depend upon the extent to which the Department of Technical Co-operation, the Plan Committee and the Consultative Committees were decentralized; it would be a consequence of those measures.

Summary

Slowly, sometimes imperceptibly, but constantly, the ITU is changing. At a certain point we must re-examine its structure and ascertain whether it suits the new circumstances. I have tried to analyze the stages through which the ITU has passed during the last ten years. It has been increasingly obliged to undertake studies and research in addition to its administrative duties. It is proposed that studies be reorganized by entrusting them to an International Telecommunication Institute. The question of the basic and further training of technical staff, already one of the Union's activities, should be given much greater priority and be adequately provided for in the future structure of the ITU. Finally, the organization should be decentralized to remove the disadvantages suffered by Member countries far from headquarters. Clearly, the Union's structure cannot be changed at a single stroke. Each measure must first be carefully studied, and results must be assessed before the next step is taken. For the present, it would suffice to agree on the general lines of future changes. But the entire future policy of the Union cannot be traced by its structure alone. Much depends on the men who guide its work day by day, on the depth and clarity of their understanding of Members' needs and wishes, on the broadness of their approach.

Normally our extracts from *The Journal 75 years ago* are summary and brief. It so happens, however, for this month of May exactly 100 years after the Union's creation in Paris, that in May 1890—that is, exactly 25 years after the same event—another ITU Conference took place in Paris—an International Telegraph Conference. Not only that. The opening speeches on that morning of 16 May 1890 are of such unusual historical interest—particularly that of the French Minister, Mr. Jules Roche—that we feel they should be disinterred from oblivion and reproduced at much greater length than is normally devoted to the items we publish in this feature. And, recalling that May 1965 is being marked by a special Centenary commemorative ceremony, in Paris once again, it seems fitting to give special emphasis to the words spoken by Mr. Nielsen of Norway on that morning 75 years ago: " Ah ! messieurs, la France, souvent souffrante de la richesse des idées qui germent sur cette terre de liberté, ne demande pas mieux que d'offrir au monde de partager avec elle les bons fruits de ses progrès et de son expérience. "

The Journal

SEVENTY-FIVE YEARS AGO

International Telegraph Conference, Paris

The International Telegraph Conference, convened by the Government of the French Republic under the terms of Article 15 of the St. Petersburg Convention, met on 16 May 1890 at 10 a.m. in the *Palais du Louvre* (cour Lefuel) in Paris.

. . . . .

At ten in the morning, *Mr. Jules Roche*, Minister of Trade, Industry and the Colonies, took the chair and addressed the Conference:

" Gentlemen,

" On behalf of the Government of the French Republic I extend you a hearty welcome.

" In choosing the city of Paris as the seat of the seventh International Telegraph Conference you have done France an honour and have paid her a tribute which she values most highly. You doubtless remember that it was France which, in 1865, inaugurated these international meetings and founded the Telegraph Union which, over the years, has been joined by all the nations of the world.

" Vienna in 1868, Rome in 1871, St. Petersburg in 1875, London in 1879, Berlin in 1885—all in their turn have been the headquarters of your Assemblies and each of them has marked a step forward in the administrative operation of this strange science, still so full of mysteries and yet already so fruitful in the services it has rendered to industry, trade and even more, it must be understood, to the general progress of mankind.

" Can you imagine the astonishment of those who invented electric telegraphy if they could see the role it plays in the world of to-day ?

" When—in France—the law of 1846 was passed, granting an extraordinary credit of 408 650 francs for the electric telegraph service between Paris and Lille, it would have been venturesome to predict that the time would come when it would be in the interests of the State to substitute electric telegraphy for ordinary telegraphy—that antique aerial device, lauded by Chappe on 12 March 1792 in the Legislative Assembly, of which the first line, also from Paris to Lille, was inaugurated on 30 November 1794 when Carnot, reading a telegram from the rostrum of the Convention, announced the surrender of the town of Condé to the Republic.

" That learned physicist Pouillet, registrar of the Law of 1846, did not himself believe that a day would come when electric telegraphy would entirely replace the old system; he estimated that a staggering original outlay of more than seven million francs would be needed to effect the change and concluded that 'economic conditions therefore seemed to make any change in the system out of the question.'

" Mr. Duchâtel, Minister of the Interior, also rejected the idea as a matter of policy.

" Only the more courageous Telegraph Administration favoured the new invention, but in so doing it aroused the deep distrust of the Budget Committee of the Chamber of Deputies, who were worried at the audacity and hastiness being shown by the bureaucracy.

" What reproaches — what objections there were to such a premature innovation ! Mr. Mauguin condemned it for its bad language — not in the sense of scandal or indiscretion — but just jargon; with highly literary turns of phrase he drove home the disadvantages of those long wires, costing enormous sums, which were bound to upset the budget and jeopardize the country's security.

" The great Berryer, full of apprehension, pleaded for further experiments. Mr. Benoist

complained bitterly that the wavy lines of the telegraph wires were painful to travellers' eyes and trembled to think of the dangers to which the wires would expose people. They might break, said that wise and prudent legislator,- and there had already been examples. If a broken wire lay along the track it might be caught up by a passing train and could fall on someone in the train — the engine-driver for instance. The driver might be killed and if an accident like that happened, just imagine the dangers involved for the whole train! He quoted another case in which a wire had been dragged a long way by an engine; that wire could pull down the telegraph posts!...

" Fortunately, despite the grave risks to the treasury, to travellers, engine-drivers and public safety, nothing in the end could hold back this fearsome novelty; and you know what strides it has made in the world since then, to the inestimable benefit of progress in general, and to the orderly conduct of Governments and private interests!

.....

" But your meetings are not going to be entirely taken up with telegraphy; telephony, first discussed at the Berlin Conference five years ago, is doubtless going to make more calls on your time.

" This latest child, whose cradle was also rocked only by scoffing, incredulity and indifference, has made very rapid progress and will have the most amazing future. Since I am confronted here by such eminent representatives from every country in the world, who have met to collaborate for peaceful ends and to improve the media whereby nation shall speak unto nation, may I remind you, not as a matter of national pride but in the highest spirit of fairness, that it was a Frenchman — not forgotten because he was never widely known—who must be regarded as the real inventor of the telephone.

" I have no wish to detract from the achievements of Reiss, Graham Bell, Hughes, Edison and the many other able or imaginative men who, since 1877, have brought this admirable invention to the stage of perfection it has attained to-day, but we must finally pay due tribute to him who was the first to formulate in every detail the complete theory of the telephone.

" Listen to what he said:

' Sounds, as we know, consist of vibrations and are carried to the ear by the reproduction of these same vibrations in the intermediate media.

' But the strength of these vibrations diminishes very rapidly with distance so that, even with megaphones, speaking-tubes and ear trumpets, there are fairly stringent limits to their reproduction. If one were to speak close to a mobile plate, flexible enough not to miss any of the vibrations produced by the voice, and if that plate successively established and interrupted communication with a battery, one could place at a distance another plate which would effect exactly the same vibrations at the same time. .....

.....

Anyone who was not deaf and dumb could use this means of transmission, which would not require apparatus of any kind; an electric battery, two vibrating plates and a metal wire would suffice.

' In innumerable cases—in large industries—firms for instance—it would be possible to send long-distance orders or notices by this method, and yet the use of this transmission by electricity is to be rejected as long as it is necessary to proceed letter by letter, using a telegraph system which requires to be learned and practised.

' Whatever happens, we can be sure that in the more or less distant future speech will be transmitted over long distances by electricity. I have started to experiment; these experiments are delicate and demand time and patience, but from the crude results obtained I can foresee success.'

" Those were the words, in 1854, of Charles Bourseul, a humble employee of the Telegraph Administration—an administration with a wealth of men who were as talented as they were modest. But!... it was in a newspaper, and an illustrated newspaper at that—*L'Illustration* of 26 August 1854—that Charles Bourseul wrote the prophetic article from which I have just quoted a passage. So who was to take seriously these visions of a dreamer—an obscure office clerk? A straw in the wind... Greeted with silence, the idea died a natural death. Quarter of a century later the telephone outlined and described by Charles Bourseul re-appeared: he truly had his revenge!

" But instead of harping on the timidity, mistakes and injustices of the past, let us profit from the experience gained and the battles won, avoiding the old mistakes and marching firmly and quickly to a better future.

" Modern science accomplishes prodigious feats; it is gradually taking possession of the planet, where for so long mankind has suffered in the shadows and in violence, and is moulding it to its will. Looking at things in the cold light of reason, what miracles could not be achieved if all the resources of genius and work could be concentrated on developing the bene-

fits of justice, science and harmony among peoples ?

" Gentlemen, you are fortunate: you are here, representing all the Governments in the world, to carry out a portion of this work. The French Republic is delighted to welcome you. It thanks your Governments and you yourselves; it awaits new reforms which—thanks to your efforts and devotion to duty—will tighten and strengthen the links of peace between nations by extending the community of their interests.

" Gentlemen: to work ... and may the new spirit guide you ! "

These words were greeted with acclamation by the Assembly.

Mr. Hake, Director of the Department of Posts and Telegraphs of the German Empire, delegate of that country, made the following reply to the Minister's speech:

" Mr. Minister,

" Gentlemen,

.....

" The Minister has already said that we are celebrating a jubilee and that the first International Telegraph Conference, held in Paris in 1865, produced extremely satisfactory results. Inspired by this undeniable fact and having heard the cordial and kindly words just spoken, we can all be confident that the work of this Conference will be equally fruitful if, as I now take the liberty of proposing, we request the French Administration to provide the Chairman for this Assembly and to guide the discussions at this Conference."

Mr. Nielsen, delegate of Norway, asked for the floor as doyen of the delegates to the Conference; he spoke in the following terms:

" Mr. Minister,

" As doyen of the Conference and on behalf of my colleagues, it is my honour to reply to the eloquent speech with which you opened our meeting.

" This is a solemn moment for me, for once again I find myself in that same capital where, twenty-five years ago, I had the privilege of attending the congress at which our Union was founded.

" At this time there are two facts to which I should like to draw your attention.

" The first fact is that our Union was the first international union of worldwide scope; the second is that it is thanks to France's initiative that this Union was founded.

" Ah ! Gentlemen, France—often overburdened with the wealth of ideas that germinate in this land of freedom—wants nothing better than to offer the world a share in the rich harvest of its progress and experience.

" It is always she who stretches out her hand to other nations, offering to join them on equal terms in grappling with the great international problems of the time which confront the government services and science.

" Her acts are a demonstration of her belief in the true brotherhood of nations.

" And this is our reply: the first time it was an effort to get even the Governments of Europe to respond to France's appeal. To-day, a quarter of a century later, at the opening of the seventh conference, you see yourself, Mr. Minister, surrounded by delegates from the contracting States and representatives of the major cable companies who have come together from nearly every corner of the globe, and I trust that you will accept me as an honest witness, since I have had the privilege of attending all the Conferences, when I say that we have been faithful to the programme inaugurated by France.

" And what is that programme ?

" One of the former Heads of State of your great and beautiful country exclaimed, at the time of an important event: ' The Pyrenees no longer exist.'

" We say: no longer shall obstacles or frontiers or the ocean's depths be allowed to hinder the free and easy circulation of telegraph communications among the peoples of the globe, and we shall seek to achieve our aim by merging the interests of each contracting State and each member company with those of the whole world.

" Thanks to the initiative of France, we form a worldwide brotherhood; at our meetings we are under your command, Mr. Minister, as once again, in the traditional spirit, we revise the texts which bind us.

" On behalf of the delegates of the contracting States and the representatives of the member companies, Mr. Minister, I offer you my respects."

By its warm applause, the Conference confirmed the sentiments expressed by the delegates of Germany and Norway.

The Minister thanked the two speakers for their kind words. He regretted that his parliamentary duties would prevent him from attending further meetings of the Conference and entrusted the chairmanship to *Mr. de Selves*, Director-General of Posts and Telegraphs of France.

Journal télégraphique — May 1890.

review review review

A list of articles in other technical publications which may be of interest to readers of the Journal. The articles are listed under the language of the publication.

FRENCH

Haut-Parleur (Le). 25, rue Louis-le-Grand, Paris 2e. Année 1965. N° **1085.** P. 47-49. Oscillateurs de relaxation à transistors pour signaux en dents de scie.

Onde électrique (L'). 40, rue de Seine, Paris 6e. Année 1965. N° **455.** P. 171-178. *Nicolas M., Poggi R.* Recherche des signaux pour radar à corrélation. — P. 179-194. *Ducot C., Cayzac J., Astor R.* La modulation d'amplitude à porteuse supprimée dans les liaisons hertziennes à grande distance. — P. 195-211. *Duquesne J., Rouzier M.* Un réseau de connexion pour central téléphonique électronique. — P. 212-227. *Marzin P.* Les calculateurs numériques étudiés au Centre national d'études des télécommunications.

Radio-REF. 60, bd de Bercy, Paris 12e. Année 1965. N° **4.** P. 247-249. *Bertemes A.* « Oscar 3 » sur orbite. — P. 268-273. *Straub S.* Emetteur de radiocommande 27, 12 MHz, modulation d'amplitude.

Radio-revue TV électronique (La). 28, rue du Prince Léopold, Borgerhout-Anvers. Année 1965. N° **3.** P. 129-130. *Smans A.* Télévision en couleurs.

Revue Siemens. Siemens-Schuckertwerke AG, 8520 Erlangen 2, Postfach. Année 1965. N° **3.** P. 88-97. *Leypold D.* Tendances d'évolution des récepteurs à ondes courtes destinés aux grandes stations de télécommunication. — P. 103-108. *Schöninger E., Seibt F.* Composants semi-conducteurs pour amplificateurs de tension continue à haute sensibilité.

Revue technique Philips. Eindhoven (Pays-Bas). Année 1965. N° **7.** P. 173-194. *Beun M., Tummers L.J.* Le comportement des transistors à fréquence croissante. — P. 199-207. *van Nie A. G., Zaalberg van Zelst J. J.* Un condensateur vibrant excité par un champ électrique haute fréquence.

Télévision. Société des éditions Radio, 42, rue Jacob, Paris 6e. Année 1965. N° **152.** P. 67-72. *Lauret J.* Le téléviseur RS 15... premier récepteur TV-couleurs français (système SECAM). — P. 84-89. *Oudin J.* Equipement de TV en circuit fermé en couleurs « THV 170 ».

Toute l'électronique. Société des éditions Radio, 42, rue Jacob, Paris 6e. Année 1965. N° **294.** P. 85-87. *Mongin F.* Les générateurs à effet Hall.

•

ENGLISH

Alta Frequenza. Associazione elettrotecnica ed elettronica italiana, Via San Paolo 10, Milano. Year 1965 (*English edition*). **No. 1.** P. 95-120. *Cavalleri G.* On local non differential (elementary) laws of electrodynamics. — P. 131-143. *Monachesi L.* VLF high-speed radiotelegraph transmission. — P. 144-147. *Mancianti M., Marchetti G., Mengali U., Salardi G.* Measurement of some characteristic parameters of am ionospheric waves.

Bell System Technical Journal (The). American Telephone and Telegraph Company, 195 Broadway, New York. N.Y. 10007. Year 1965. **No. 2.** P. 235-252. *Saltzberg B. R., Kurz L.* Design of bandlimited signals for binary communication using simple correlation detection. — P. 253-260. *Rappeport M. A.* Four-phase data systems in combined delay distortion, Gaussian noise, and impulse noise.

British Communications and Electronics. Heywood and Co. Ltd., Drury House, Russell Street, Drury Lane, London WC 2. Year 1965. **No. 4.** P. 222-227. *Bowers B. C.* Prospects for optical communication in space.

Electronics. 330 West 42nd Street, New York, N.Y. 10036. Year 1965. **No. 3.** P. 54-59. *Bonin E. L.* Light-coupled semiconductor switch for low-level multiplexing. — P. 75-78. *Peters C. J., Lucy R. F., Lang K. T., McGann E. L., Ratcliffe G.* Laser-television system developed with off-the-shelf equipment. — P. 79-86. *Keats E. S.* Navigational satellites: beacons for ships and planes.

Japan Telecommunications Review. Nippon Telegraph and Telephone Public Corporation, 1-1, Uchisaiwai-cho, Chiyoda-ku, Tokyo. Year 1965. **No. 1.** P. 17-27. *Komatsuzaki S., Ito H.* Market research on telephone service. — P. 41-48. *Hirasawa S., Nobukini H.* Data transmission system on point-to-point circuits.

Journal of the Institution of Telecommunication Engineers. Post Box 3012, New Delhi. Year 1964. **No. 10.** P. 491-497. *Basu Maj. A., Gupta Shri B. D.* Transistorized time division multiplexing switch.

Point to Point Telecommunications. Marconi Company Limited, Chelmsford. Year 1965. **No. 2.** P. 5-22. *East F. R.* The properties of the ionosphere which affect HF transmission. — P. 41-55. *Beard J. V.* The design of self-tuned HF receivers.

Proceedings. The Institution of Radio and Electronics Engineers Australia, Box 3120, GPO, Sydney. Year 1965. **No. 1.** P. 11-18. *Craven G.* Channel-separating filters for long distance communication by waveguide.

Proceedings of the IEEE. The Institute of Electrical and Electronics Engineers Inc., 345 East 47th Street, New York, N.Y. 10017. Year 1965. **No. 1.** P. 12-23. *Arams F. R., Peyton B. J.* Eight-millimeter traveling-wave maser and maser-radiometer system. — P. 42-55. *Steenson B. O., Stirling N. C.* The amplitude distribution and false-alarm rate of filtered noise. — P. 56-73. *Nicholson A. F.* Error signals and discrimination in optical trackers that see several sources.

No. 2. P. 116-128. *Rihaczek A. W.* Radar signal design for target resolution. — P. 137-141. *King M.* Some parameters of a laser-type beyond-the-horizon communication link.

Proceedings of the Institution of Electrical Engineers. Savoy Place, London WC 2. Year 1965. **No. 3.** P. 469-476. *Levy R.* Transmission-line directional couplers for very broad-band operation. — P. 487-492. *Allnatt J. W., Prosser R. D.* Subjective quality of television pictures impaired by long-delayed echoes.

Radio Science. US Government Printing Office, Washington DC 20402. (Section D of *Journal of Research of the National Bureau of Standards*). Year 1965. **No. 2.** P. 231-234. *Peters Jr., L.* Radar cross sections of plasma bodies at the plasma frequencies. — P. 235-242. *Kun-Mu Chen.* Electroacoustic waves excited by a space vehicle in ionized atmosphere and its effect on radar return. — P. 247-256. *Wait J. R.* Scattering of electromagnetic and electroacoustics waves by a cylindrical object in a compressible plasma. — P. 257-266. *Brice N.* Multiphase periodic very-low frequency emissions. — P. 273-286. *Lerner R. M., Max J.* VLF and LF fields propagating near and into a rough sea.

Western Union Technical Review. 60 Hudson Street, New York, N.Y. 10013. Year 1965. **No. 1.** P. 4-13. *Steeneck R.* Development of error correcting codes (II — Multiple-bit error correcting codes). — P. 14-21. *Ridings G. H.* Facsimile imaging systems (II).

Wireless World. Dorset House, Stamford Street, London SE 1. Year 1965. **No. 3.** P. 108-112. *Dance J. B.* Tunnel diode measurements — Simple methods for checking characteristics of lower speed devices. — P. 113-115. *Macdiarmid I. F., Shelley I. J.* Correcting colour signal distortion. — P. 124-128. *Butler F.* Transistor wide-band cascade amplifiers.

•

SPANISH

Revista de telecomunicación. Palacio de Comunicaciones, Madrid. Año 1964. N.º **78.** P. 8-16. *Sáez Vacas F.* P.C.M. transmisión por impulsos codificados. — P. 17-22. *González Velasco E.* Amplificadores paramétricos. — P. 23-30. *Balta-Elías J.* Las dificultades intrínsecas de los sistemas actuales de la TV cromática.

Revista española de electrónica. Apartado 5252, Barcelona. Año 1965. N.º **124.** P. 34-35. *Cortina J.* La red de telecomunicaciones vía satélite, realidad próxima. — P. 57-59. La transistorización parcial de los televisores (II).

Revista telegráfica electrónica. 653, Avenida Martín García, Buenos Aires. Año 1965. N.º **628.** P. 68-69. *Arnaud J. P.* Gráficos para la adición y sustracción de potencias expresadas en db, para la conversión decibeles-nepers y la interconversión de dbao, dbmO, dbrn-C, pwO y FEM psofométrica.

•

GERMAN

Archiv der elektrischen Übertragung. S. Hirzel Verlag, Stuttgart. Jahrgang 1965. **Nr. 3.** S. 125-133. *Harmuth H.* Die Übertragungskapazität von Nachrichtenkanälen nach der Verallgemeinerung des Begriffes Frequenz. — S. 155-166. *Hofmann R.* Die Summation von endlichen und unendlichen Reihen algebraischer und trigonometrischer Art und ihre Anendung auf Probleme der theoretischen Elektrotechnik.

Frequenz, Zeitschrift für Schwingungs- und Schwachstromtechnik. Fachverlag Schiele und Schön GmbH, Markgrafenstrasse, Berlin SW 61. Jahrgang 1965. **Nr. 3.** S. 80-88. *Heinlein W.* Aussteuerbereich, Verstimmung und Verzerrungen parametrischer Verstärker mit Kapazitätsdioden. — S. 89-96. *Holle J.* Mehrfachsenderweiche für fünf 10 kW-UKW-Rundfunksender im Frequenzbereich von 87 bis 108 MHz.

Funk-Technik. Eichborndamm 141-167, Berlin-Borsigwalde. Jahrgang 1965. **Nr. 5.** S. 157-160. *Bet.* Vom NTSC-Farbfernseh-System zum PAL-Verfahren, einer Variante mit Farbtonstabilisierung.

Nr. 6. S. 215-218. *Czernetzki H.-P.* Richtantennen.

Zeitschrfit für das Post- und Fernmeldewesen. Josef Keller Verlag, Bonn. Jahrgang 1965. **Nr. 5.** S. 153-170. *Schön H., Wallner A.* Zentraltelegraphenstelle München mit neuem Gesicht.

•

ITALIAN

Poste e Telecomunicazioni. Via G. Massaia 31, Roma. Anno 1965. N° **1-2.** P. 22-34. *Treves S.* La teleselezione in Italia, in Europa, nel mondo. — P. 35-37. La TV a colori — Un sistema unico europeo?

Radio Industria. Via Ripamonti 115, Milano. Anno 1965. N° **306.** P. 37-39. *Caccia G. G.* Lo stadio finale video.

•

SLAV LANGUAGES

Электросвязь. ул. Горького, 7, Москва, К-9. 1965 год. **№ 3,** Стр. 1-12. *Бадалов А. Л.* О некоторюх принципах распределения радоичастотного спектра и составления планов для различных радиослужб. — Стр. 23-31. *Соколов В. В., Пелехатый М. И.* Влияние корреляции помех на помехоустойчивость когерентного приёма фазовой телеграфии. — Стр. 32-40. *Алфеев В. Н., Ратбиль Э. Л.* Расчёт многорезонаторных избирательных параметрических усилителей. — Стр. 47-52. *Дубровский И. А., Шагурин И. И.* Нестабильность коэффициента усиления однокаскадных усилителей на туннельных диодах в области средних частот. — Стр. 65-71. *Дивногорцев Г. П.* Групповое время замедления телефонных каналов и методы уменьшения его неравномерности.

Український Фізичний Журнал. Київ-28, Велика Китаївська, 115, пінститут Напівпровідників. АН УРСР. 1965. **№ 3.** Стр. 275-286. *Зуев В. О., Саченко А. В., Толпиго, К. Б.* Кінетика фотопровідності в напівпровідниках з рівнями захоплення неосновних носіїв на поверхні. — Стр. 312-322. *Марушко І. О., Машкевич В. С.* Генерація другої оптичної гармоніки в резонаторі лазера.

Slaboproudy Obzor. Nové Mestro. Krakovská 8, Praha 1. 1965. **Čis 3.** Str. 129-138. *Hrycej J., Vojtášek S.* Nová metoda měření proudových zisků a mezních kmitočtů tranzistorů. — Str. 144-149. *Pazderák J.* Srovnání soustavy barevné televize SECAM a soustavy s kvadraturní modulací (NTSC) kritériem celkové kvality obrazu.

Čis 4. Str. 193-202. *Djadkov S.* Rezonanční transformace a jejich použití při stanovení odezvy lineárních oscilačních obvodů na libovolnou vstupní funkci. — Str. 203-209. *Pátek K., Čsav F., Pečený T.* Polovodičové lasery.

Telekomunikacije. Postanski fah br. 1110, Beograd. 1964. **Broj 3-4.** Str. 7-14. *Marinković V.* Kola za kompenzaciju viših učestanosti širokopojasnih video-pojačavaca tj. za skraćenje vremena uspostavljanja kod impulsnih pojačavača. — Str. 15-22. *Holcer N.* O prenosu podataka. — Str. 22-26. *Novak J.* Bezgajtansko posredovanje medjumesnih telefonskih razgovora u javnom telefonskom saobraćaju (sistem « ISKRA »).

•

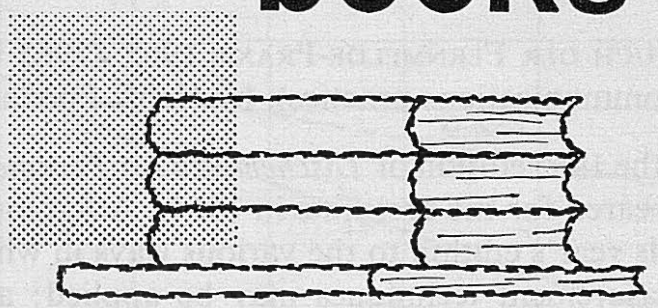
MULTILINGUAL

Technische Mitteilungen (Bulletin technique — Bollettino tecnico) PTT. Administration des télégraphes et des téléphones, 6, Speichergasse, Berne. Année 1965. **Nr. 3.** S. 69-80. *Meyer K.* Der Einsatz mobiler Richtstrahlanlagen im schweizerischen Fernsehnetz. L'emploi d'installations à faisceaux hertziens mobiles dans le réseau de télévision suisse. — S. 81-86. *Naegeli F.* Eine tragbare Richtstrahlanlage zur Übermittlung von Videosignalen im 7000-MHz-Bereich.

N° **4.** P. 97-107. *Eberlé R.* Installation automatique d'appel, système PTT, pour les ordres de réveil en abonnement. Automatische Rufeinrichtung System PTT für Abonnementsweckaufträge. — S. 108-115. *Kerlé W.* Logarithmisch-periodische Antennen. Antennes logarithmiques périodiques pour la radiodiffusion en ondes courtes. — S. 116-122. *Rösch H., Bongard P.* Die Stadtantenne in Baden AG. L'antenne urbaine de Baden AG.

---

books



PROGRESS IN RADIO SCIENCE 1960-1963. Volume VIII: SPACE RADIO SCIENCE, edited by Ken-ichi Maeda and Samuel Silver.[1]

This monograph contains the papers presented at the Space Radio Research Session of the XIVth General Assembly of URSI held in Tokyo in September 1963, which was organized by the Committee on Space Radio Research, URSI, headed by Professor S. Silver.

Space radio science, notwithstanding its title, presents discussions of all aspects of space science and technology. Of special note are the stimulating contributions on satellite communication systems and devices. Papers included deal with all important phases between satellites and the ground, and in

this context the problems of data processing and other vital features such as antenna, satellite orbit and attitude were investigated.

The book presents a complete survey of this area and will make a valuable addition to the literature on ionospheric and planetary physics and optical and radio sciences.

A. El-Zanati

[1] One bound volume; pp. 235, illustrations, tables, diagrams. 23 × 15 cm. Published by *Elsevier Publishing Company*, 110-112 Spuistraat, Amsterdam, 1965. Price 37.50 Dutch florins; 75 shillings; 42 German marks.

•

WORKED EXAMPLES IN ELECTRONICS AND TELECOMMUNICATIONS —VOL. I: PROBLEMS IN ELECTRONICS—VOL. II: PROBLEMS IN ELECTRONIC THEORY AND COMMUNICATIONS, by B. Holdsworth and Z. E. Jaworski. [2]

The first two volumes of *Worked examples in electronics and telecommunications* have just appeared. It has been written specifically to meet the needs of students preparing for the B.Sc. Final examination in electronics and electrical engineering, and for those preparing for the qualifying examinations of the professional bodies. The problems are taken from past examination papers—Parts 2 and 3 of the London University Final degree paper and the Graduate Examinations of the Institution of Electrical Engineers.

In the first volume chapters cover problems on general circuit theory; coupled circuits; electron ballistics; valve parameters and equivalent circuits; voltage amplifiers; power amplifiers; oscillators and valve non-linearities; and power suppliers and filters.

In the second volume chapters cover electric and magnetic field theory; transmission lines; electro-acoustics; transients; harmonics; and illumination.

A. El-Zanati

[2] Two linen bound volumes; pp. 209, 343, illustrations, tables, diagrams. 22 × 14 cm. Published by *Associated Iliffe Press Limited*, Dorset House, Stamford Street, London SE.1, 1965. Price 25 and 22 shillings 6 pence (in the United Kingdom only).

•

TASCHENBUCH DER FERNMELDE-PRAXIS 1965. (1965 Handbook of telecommunications practice), by Heinz Pooch. [3]

This is the 1965 edition of *Taschenbuch der Fernmelde-Praxis* which appeared for the first time in 1964. Attention has been paid in this year's edition to the various ways in which operational measurement techniques may be applied: audio- and carrier-frequency measurement technique, radio relay systems and measurements of telephone traffic. The following sections appear for the first time: electroacoustics, sound transmission technique, telegraph transmission technique, telex exchange technique, telex apparatus, television frequency convertors and radio services in the Federal Republic of Germany. The 1964 sections have been completely re-written and brought up-to-date.

The handbook contains 18 sections dealing with transmission technique, electroacoustics, audio- and carrier-frequency transmission systems and measurement techniques, sound transmission technique, technique of radio relay systems, measurement of radio relay systems, theory of traffic, traffic measurement, local exchange technique, long distance exchange technique, telegraphy, telex exchanges, telex apparatus, line technique, television transmitters, television frequency convertors, and radio services in the Federal Republic of Germany.

Designed to serve as a reference book for telecommunication technicians, the handbook contains definitions, tables, circuit diagrams and other operational data. It is a valuable reference book and an important contribution to the literature on telecommunications.

A. El-Zanati

[3] One plastic bound volume; pp. 588, illustrations, tables, diagrams. 15.5 × 10.5 cm. Published by *Fachverlag Schiele und Schön GmbH*, Berlin, 1965. Price 11 German marks.

•

THE RADIO AMATEUR'S HANDBOOK, 42nd edition, by the headquarters staff of the American Radio Relay League. [4]

Written with the needs of the practical amateur constantly in mind, *The radio amateur's handbook* is the standard manual of amateur radio communications, construction and design.

Virtually continuous modification is a feature of the handbook, but always with the objective of presenting the soundest aspects of current practice rather than the merely new and novel. It has earned universal acceptance not only among the amateurs but by all segments of the technical radio world.

An indispensable part of the amateur's equipment, the 42nd edition of the handbook is an invaluable addition to the literature on amateur radio communications.

A. El-Zanati

[4] One volume, paper cover; successive pagination, illustrations, tables, graphs. 24 × 16 cm. Published by *American Radio Relay League*, West Hartford, Connecticut, 1965. Price 4 dollars; 26.45 Swiss francs.

•

WIDERSTÄNDE, KONDENSATOREN, SPULEN UND IHRE WERKSTOFFE (Resistors, capacitators, coils and their materials), by Otto Zinke. [5]

This book is intended as an introduction to the study of resistors, capacitators, coils and the materials of which they are made.

Chapter 1 deals with resistors and their materials. The reader will find the basic laws governing the specific resistance of non-magnetic and magnetic conductor materials.

Chapter 2, on capacitators and insulating materials, describes in detail the design of fixed and variable capacitators as well as the technical capacitator and its losses. Following a survey of gases and liquids as insulating materials, solid insulators are divided into two groups: materials which can be coiled or bent (paper, metal oxide layers, synthetic strips) and rigid insulating materials (duroplast, quartz, glass, mica, ceramics, with higher and lower dielectric constants).

Chapter 3 deals with coils and magnetic materials. It puts forward some fundamental ratios for calculating magnetic field strengths and inductance in wire coils, Helmholtz parallel coils and also optimum cylindrical coils, pancake coils, coils with quadratic spacing and coils with a small stray field. A review of the various magnetic phenomena serves as an introduction to the properties of magnetically hard and soft materials and alloys.

A. El-Zanati

[5] One linen bound volume; pp. XII + 232, illustrations, tables, diagrams. 25 × 15 cm. Published by *Springer-Verlag*, Heidelberger Platz 3, 1 Berlin 31, Wilmersdorf, 1965. Price 28.50 German marks.

Communication from the Specialized Secretariat of the CCIR

Solar indices for ionospheric propagation

THE FOLLOWING TABLES, giving values of the basic indices for ionospheric propagation have been prepared by the Specialized Secretariat of the International Radio Consultative Committee (CCIR) in accordance with CCIR Resolution 4, Recommendation 371, and Report 246.

Note: A considerable amount of information on ionospheric indices will be found in an article by C.M. Minnis, entitled *Ionospheric indices* on pages 1-36 of the recent publication *Advances in radio research*, volume 2, edited by J.A. Saxton (*Academic Press*, London and New York, 1964).

Parameters:

● R_{12} (smoothed mean, over twelve months, of the number of sunspots observed):

Year \ Month	1	2	3	4	5	6	7	8	9	10	11	12
1963	29	30	30	29	29	28	28	27	27	26	23	21
1964	19	18	15	13	11	10	10	10	10	9		

● I_{F_2} (ionospheric index):

Month (year 1964)

1	2	3	4	5	6	7	8	9	10	11	12
0(2)*	6(2)*	20(2)*	14(2)*	1(2)*	–3(1)*	1(1)*	–3(1)*	4(1)*	3(1)*	-3(1)*	-4(1)*

Month (year 1965)

1	2	3
7(1)*	5(1)*	20(1)*

* *The figures in brackets represent the number of values of foF_2 which have not yet reached the CCIR Secretariat, and which have not therefore been taken into account in the calculation of I_{F_2}. For further details, see the* Telecommunication Journal, *April 1964, page 119.*

With regard to the data contained in CCIR Report 246, one ionospheric sounding station has ceased to operate—Puerto Rico (in June 1963). The values of I_{F_2}, that include the figure (1) in brackets are therefore, as from the month of June 1963, definitive values for I_{F_2}. Furthermore the sounding station Fairbanks did not operate during the period August-October 1963. For this period the definitive values of I_{F_2} are those including the figure (2) in brackets.

● Φ (monthly mean value of solar noise flux) **:

Month	1	2	3	4	5	6	7	8	9	10	11	12
Year												
1964	74	76	75	73	69	69	67	69	70	73	73	78
1965	78	75	74									

** *Data kindly supplied by the National Research Council, Ottawa.*

Forecasts for the next few months (1 May, 1965)* :**

● R_{12}

Year \ Month	5	6	7	8	9	10
1965	14	15	16	17	18	20

*** *Data kindly supplied by Professor Waldmeier, Federal Observatory, Zurich.*

Estimated error in forecasts of R_{12}: ± 10

● I_{F_2} ****

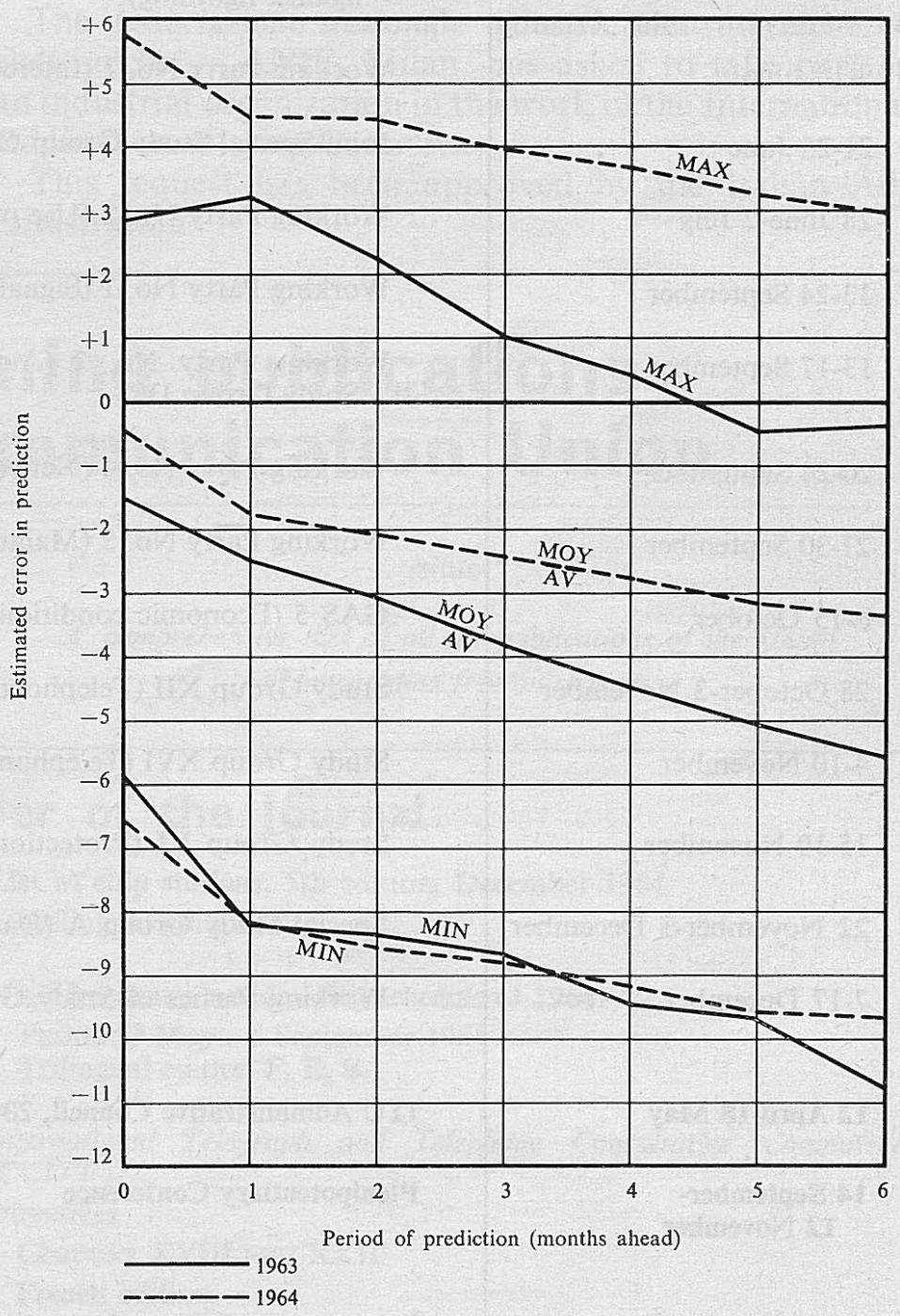
Year \ Month	3	4	5	6	7	8	9
1965	4	5	7	9	11	13	(16)

**** *Data kindly supplied by the Department of Scientific and Industrial Research, Radio Research Station, Slough.*

The figure in brackets is the value forecast six months in advance.

Estimate of the error in I_{F_2} predictions:

Month (1965)		3	4	5
Maximum		+5.5	+3.5	+3.5
Minimum		–8	–11	–11.5
Month (1965)	6	7	8	9
Maximum	+3	+3	+4.5	+2
Minimum	–12.5	–12.5	–12.5	–13



Analysis of I_{F_2} predictions during 1963 and 1964

official announcements

Calendar of ITU conferences and meetings

Date	Title	Place
1965		
	International Radio Consultative Committee (CCIR):	
9-22 June	Study Group V (Propagation over the surface of the earth and through the non-ionized regions of the atmosphere)	Geneva
9-23 June	Study Group I (Transmitters)	Geneva
9-29 June	Study Group II (Receivers)	Geneva
23 June-9 July	Study Group VI (Ionospheric propagation)	Geneva
24 June-9 July	Study Group III (Fixed service systems)	Geneva
30 June-9 July	CMTT (CCIR/CCITT Joint Commission for television transmissions)	Geneva
1-10 September	Study Group XIII (Mobile services)	Geneva
	International Telegraph and Telephone Consultative Committee (CCITT):	
4-11 May	Joint Working Party of Study Group V and Study Group VI (Protection against lightning)	Rome
9-18 June	Working Party No. 1 (Intercontinental maintenance) of Study Group IV	Geneva
21-25 June	Joint Special Study Group C (CCITT/CCIR) (Circuit noise)	Geneva
28 June-2 July	Working Party No. 2 (Use of the test chart) of Study Group XIV	Geneva
13-24 September	Working Party No. 1 (Signalling system No. 6) of Study Group XI	Stockholm
13-17 September	Working Party No. 2 (Automatic transmission measuring equipment) of Study Group IV	Geneva
20-24 September	Working Party No. 4 (Network stability) of Study Group IV	Geneva
27-30 September	Working Party No. 3 (Maintenance programme) of Study Group IV	Geneva
6-15 October	GAS 5 (Economic conditions and telecommunication development)	Geneva
28 October-3 November	Study Group XII (Telephone transmission performance)	Geneva
4-10 November	Study Group XVI (Telephone circuits)	Geneva
15-19 November	Study Group VI (Protection and specifications of cable sheaths and poles)	Geneva
22 November-3 December	Special Study Group A (Data transmission)	Brussels
7-17 December	Working Parties of Study Group IX (Telegraph transmission)	Geneva
12 April-18 May	**ITU Administrative Council,** 20th Session	**Geneva**
14 September-12 November	**Plenipotentiary Conference**	**Montreux (Switzerland)**

Invitations accepted to conferences or meetings external to the Union

Date	Organization	Nature of conference or meeting	Place	Representatives
1965				
3-14 May	World Meteorological Organization (WMO)	Technical Conference on Meteorological Telecommunications in South Asia and adjacent areas	Colombo (Ceylon)	Mr. M. N. MIRZA (IFRB)
27 May-11 June	World Meteorological Organization (WMO)	17th session of the Executive Committee	Geneva	Mr. R. COOK (General Secretariat) Mr. R. FROOM (CCIR)
31 May-12 June	European Conference of Postal and Telecommunications Administrations (CEPT)	IVth ordinary session of the Plenary Assembly	Lisbon	Mr. Gerald C. GROSS (Secretary-General)
1-4 June	International Radio-Maritime Committee (CIRM)	37th meeting of the Technical Committee	Oslo	Mr. René PETIT (IFRB) Mr. Leslie W. HAYES (CCIR Acting Director)

PARTIAL REVISION OF THE RADIO REGULATIONS (GENEVA, 1959) BY THE EARC (GENEVA, 1963)

The **Kingdom of Cambodia,** the **Malagasy Republic,** the **Overseas Territories for the international relations of which the Government of the United Kingdom of Great Britain and Northern Ireland are responsible** have approved the partial revision of the Radio Regulations (Geneva, 1959) by the Extraordinary Administrative Radio Conference to allocate frequency bands for space radiocommunication purposes (Geneva, 1963).

TELEGRAPH AND TELEPHONE REGULATIONS (GENEVA, 1958)
ADDITIONAL RADIO REGULATIONS (GENEVA, 1959)

The **Kingdom of Cambodia** has approved the Telegraph Regulations (Geneva, 1958), the Telephone Regulations (Geneva, 1958), and the Additional Radio Regulations (Geneva, 1959).

INTERNATIONAL RADIO CONSULTATIVE COMMITTEE (CCIR)

The **Associazione nazionale industrie elettrotecniche ed elettroniche — ANIE,** Milan, has asked to take part as an industrial organization in the work of the International Radio Consultative Committee.

This request has been approved by the Italian Administration.

List of recent and forthcoming publications of the International Telecommunication Union

The following letters indicate the languages in which documents are published:

F *for French* **S** *for Spanish*
E *for English* **R** *for Russian*
C *for Chinese*
Prices are in Swiss francs

Note

A comprehensive list of all the publications of the Union will be supplied free on request.

I. Publications issued since the last number of the Journal

Centenary Book « From semaphore to satellite » **(Livre du centenaire: Du sémaphore au satellite)**
French edition.

Routing table for offices taking part in the gentex service, 2nd edition, December 1964
Trilingual edition **F, E, S.**
Price: 8.40 Sw. fr.

Summary of monitoring information received by the IFRB on the use by broadcasting stations of the exclusive high frequency broadcasting bands (BC5)
Periods: 28 February-6 March and 7-13 March
Trilingual edition **F, E, S.**

List of ship stations, 5th edition, December 1964
Trilingual edition **F, E, S.**

High frequency broadcasting schedule (J 1964)
Period: 3 May - 6 September 1964
Trilingual edition **F, E, S.**

International Telegraph and Telephone Consultative Committee (CCITT):

Directives
Chapters XVIII and XXII
French edition.
Price: free of charge

II. Forthcoming publications

Centenary Book: **From semaphore to satellite**
Spanish edition.

Map of coast stations which are open to public correspondence or which participate in the port operations service, 9th edition, 1965

List of telegraph offices, 22nd edition, January 1966
Trilingual edition **F, E, S.**

List of fixed stations operating international circuits, 3rd edition, June 1965
Trilingual edition **F, E, S.**

Summary of monitoring information received by the IFRB
No. 105 (February 1965)
Trilingual edition **F, E, S.**

Summary of monitoring information received by the IFRB on the use by broadcasting stations of the exclusive high frequency broadcasting bands
6 Summaries per year:
4 Summaries related with the last and first weeks of any two consecutive seasonal schedules
2 Summaries related with the seventh week of any four-month seasonal schedule
Trilingual edition **F, E, S.**

High frequency broadcasting schedules
(4 publications per annum)
Trilingual edition **F, E, S.**

List of broadcasting stations operating in bands below 5950 kc/s, 3rd edition, June 1965
Trilingual edition **F, E, S.**

List of broadcasting stations operating in bands between 5950 and 26 100 kc/s, 2nd edition (September 1961-August 1962)
Trilingual edition **F, E, S.**

Report of the First Session of the Extraordinary Administrative Aeronautical Radio Conference, Geneva, January-February 1964
Separate editions in **F, E, S.**

List of international telephone routes, 5th edition, 1 January 1965 (Europe, Africa, the Americas, Asia, Oceania, intercontinental channels).
Trilingual edition **F, E, S.**

Table of international telex relations, on 31 December 1964
Trilingual edition **F, E, S.**

Alphabetical list of call-signs of stations other than amateur stations, experimental stations and stations of the maritime mobile service **(List VIIB),** 2nd edition, 1965
Multilingual edition in **F, E, S, R, C.**

International frequency list, 3rd edition, 1965
Preface in separate editions **F, E, S.**
Titles and column-headings of volumes I, II, III and IV in **F, E, S, R, C.**

International Radio Consultative Committee (CCIR):

Xth Plenary Assembly, Geneva, 1963
Vol. I — Emission. Reception. Vocabulary. **Spanish** edition.
Vol. II — Propagation. **Spanish** edition.
Vol. III — Mobile service. Standard frequencies and time signals Monitoring. **Spanish** edition.
Vol. IV — Radio relay systems. Space systems. Radio astronomy. **Spanish** edition.
Vol. V — Broadcasting. Television. **Spanish** edition.
Vol. VI — List of participants. Reports to the Plenary Assembly. Resolutions of a general nature. Place of the XIth Plenary Assembly, etc. **Spanish** edition.
Vol. VII — Minutes of plenary meetings. **Spanish** edition.

Manual on high-frequency directional antennae
Separate editions in **F, E, S.**

Propagation data obtained in radio-relay systems
Trilingual edition **F, E, S.**

International Telegraph and Telephone Consultative Committee (CCITT):

Directives
Spanish edition possibly.

Codes and abbreviations for use in international telecommunication, 2nd edition
Spanish edition.

Manual on the National telephone networks for the automatic service
Spanish edition.

Instructions for the intercontinental telephone service
Spanish edition.

Instructions for the international telephone service
Separate editions in **F, E, S.**

IInd Plenary Assembly, New Delhi, 1960
Red Book
Vol. V. Spanish edition.

IIIrd Plenary Assembly, Geneva, June 1964
Red Book
Vol. V bis — Additions and amendments (Quality of telephone transmission and telephone apparatus)
Separate editions in **F, E, S.**

Blue Book
Vol. I — Minutes and reports of the IIIrd Plenary Assembly. Resolutions, Opinions, Recommendations, Questions; Study Groups and Working Parties for 1964-1968
Vol. II — Telephone and telegraph operation tariffs
Vol. III — Line transmission
Vol. IV — Transmission maintenance of international lines, circuits and chains of circuits
Vol. VI — Telephone signalling and switching
Vol. VII — Telegraph technique
Vol. VIII — Data transmission
Vol. IX — Protection against disturbances. Protection of cable sheaths and poles
Separate editions in **F, E, S.**

Conditions of sale

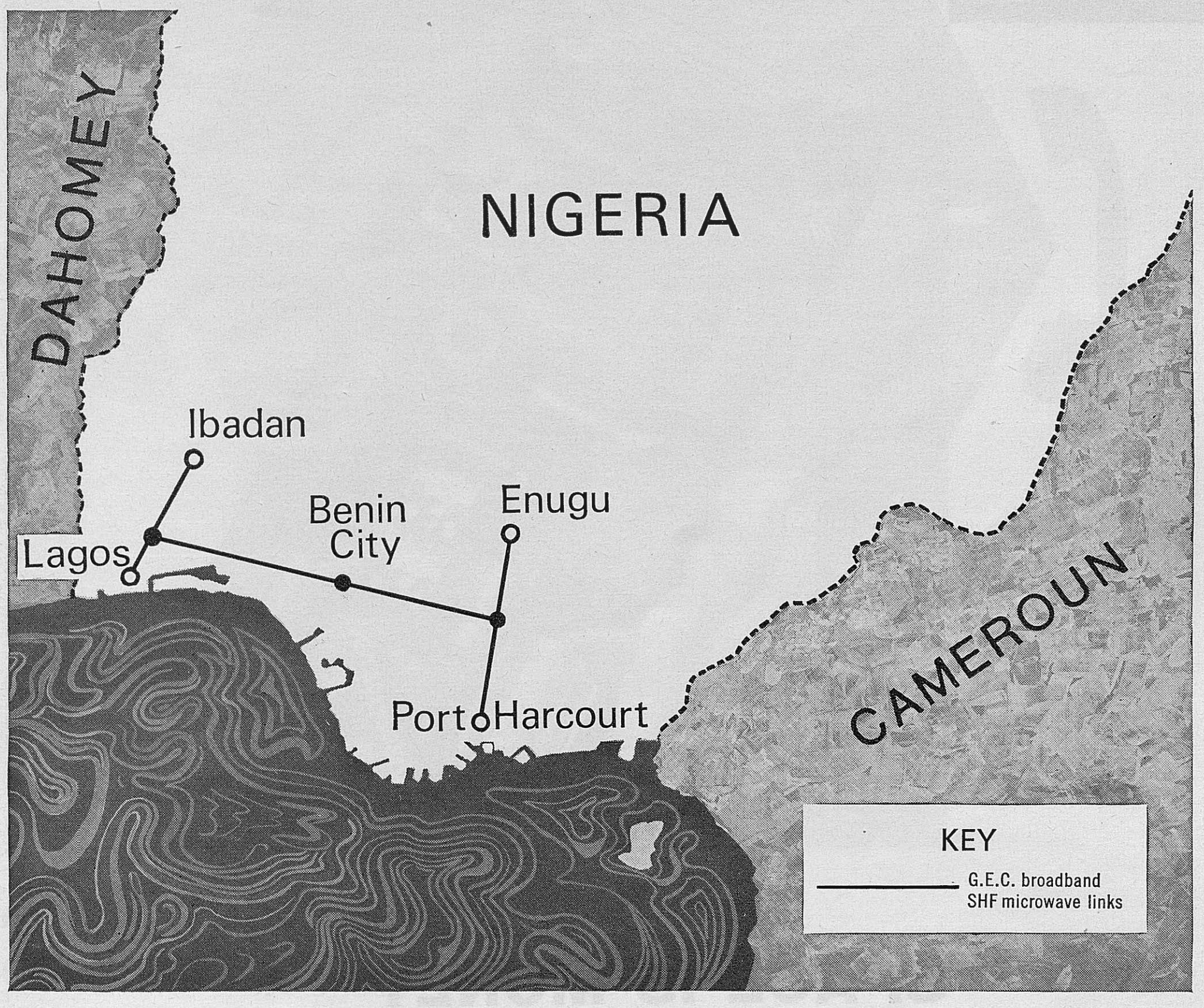
All documents ordered from the General Secretariat of the ITU (Place des Nations, 1211 Geneva 20, Switzerland) must be paid for in advance. Documents must be paid for in Swiss francs when they are ordered, unless a cash-on-delivery arrangement is requested.

Methods of payment:

a) Switzerland: postal cheque account - *Genève 12-50*
b) Other countries: international postal order or bank transfer on the *Société de Banque Suisse*, Geneva.

The prices quoted include packing costs and carriage by surface mail.
As the General Secretariat of the ITU sells its publications on a non-profit-making and non-discount basis, no reduction can be made to booksellers.

NIGERIA-AND G.E.C.



Against strong international competition G.E.C. has secured the contract for the first step of the new Nigeria Telecommunications System Development Programme. This £1¾ million contract provides for 472 route miles of modern broadband SHF microwave equipment, together with the associated carrier multiplex equipment, all of it fully transistored. This will link Lagos, Ibadan, Enugu and Port Harcourt.

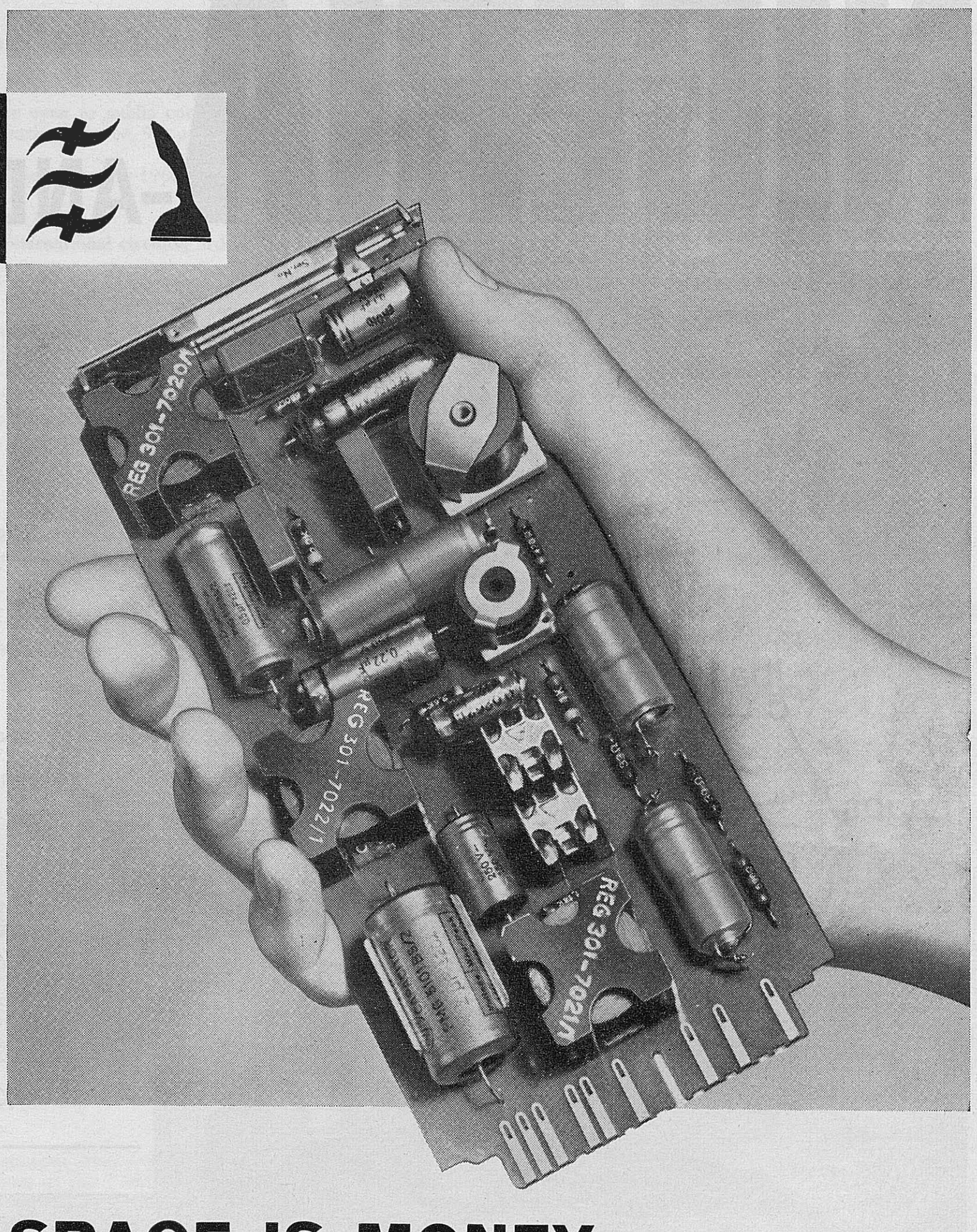
The part of the network linking Lagos with Port Harcourt will be completed by the end of September 1965, and the spurs to Enugu and Ibadan one month later. In addition, G.E.C. will be responsible for building access roads, erecting station buildings and furnishing power plant.

Recent orders for G.E.C. Telecommunications' equipment received from Iceland, Tunisia and El Salvador emphasise its reliability under all climatic conditions and make it the natural choice for any new telecommunication development programme.

G.E.C. everything for telecommunications

Transmission Division, G.E.C. (Telecommunications) Ltd · Telephone Works · Coventry · England SP28

Ericsson LM



SPACE IS MONEY

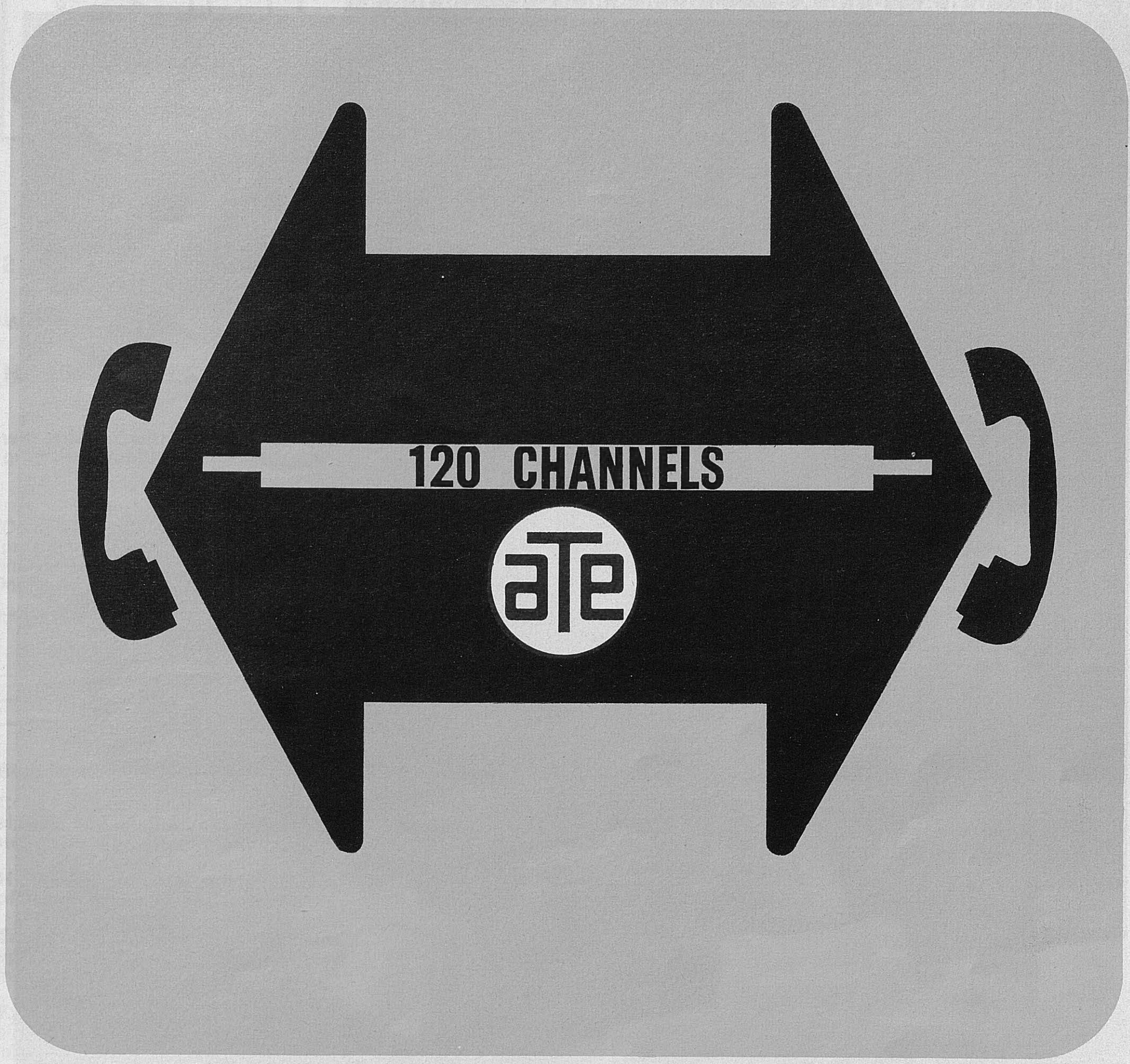
— and the saving of space has become an ever-increasing demand from telephone administrations all over the world. Miniaturization is the answer.

To be the first to use miniaturization is excellent — to be able to offer proven and absolutely reliable miniaturized equipment is better still.

L M Ericsson supply carrier systems requiring less than one third of the space occupied by systems of earlier designs — and giving better performance. That is worth-while miniaturization — that is what we mean by

the carrier systems of today and tomorrow

L. M. ERICSSON TELEPHONE COMPANY
LONG DISTANCE DIVISION STOCKHOLM 32 SWEDEN



An economical 120-channel coaxial system using a single tube

The ATE/C120A Line Transmission Equipment transmits 120 speech channels in both directions over a single aerial or underground 0.375″ coaxial tube; power feeding, regulation, alarm and monitoring facilities are all included without subsidiary cable paths. Fully transistorised, the C120A is inexpensive to operate—'power feed' is needed only every 200 miles. Installation and maintenance are simple, and can be carried out by staff unfamiliar with coaxial systems. For full details of this economical coaxial line transmission equipment, please write to: Automatic Telephone & Electric Co. Ltd., 8 Arundel St., London, W.C.2, England. Telephone: Temple Bar 9262. *A Principal Operating Company of the Plessey Group.*

Intermediate power feed repeater

ATE(E)23

Number of speech channels: 120.
Type of transmission: 2-wire.
Baseband frequency:
H.F. direction 812-1304 kc/s.
L.F. direction 60-552 kc/s.

Terminal and main repeaters:
Input from STE —45 dbr (min).
Output to STE —20 dbr (max).

Rhapsody in reservations

One lightning run on the keyboard. One concise cadenza of notes. And your reservation on a train is placed . . . checked . . . cleared. The ultimate in sophistication.

The virtuoso — the Mars 101 system. This is now operational throughout the Japanese National Railways. Terminal equipment at each ticket window plays information directly into an electronic computer at the Tokyo centre.

In a flash an answer is returned by telegraph tandem exchanges. The reservation has been noted and accepted.

Hitachi, Ltd.
Telecommunications Division

This entirely automatic system is a product of over-all technology in electronics, computing, transmission and exchange.

Hitachi Telephonics, by the design and installation of this equipment, clearly demonstrates its vigorous development programs, its finger-tip knowledge of adjacent technologies and the wealth of experience it can call on from other Hitachi divisions.

CIT

LES CÂBLES DE LYON

LAND, SUBMARINE, RADIO AND SPACE TELECOMMUNICATIONS

12 CHANNELS?

2 700 CHANNELS?

Whatever your problem

H 63 MULTIPLEX SYSTEM

will solve it with its large built-in growth capability.

Completely solid state, ultra-compact, providing high quality CCITT performance, H 63 carrier telephone system includes:

—standard basegroup B equipment, translating 12 4 kc/s channels by direct modulation.
—group and supergroup equipment.
—carrier and pilot supply.
—through routing facilities.

Modular construction

CCITT standard size prewired racks, shelves and plug-in units. **120 channels with signalling in one rack.**

High reliability through stern choice of components and quality control.

Ease of maintenance with minimum upkeep personnel by instant replacement of complete plug-in units.

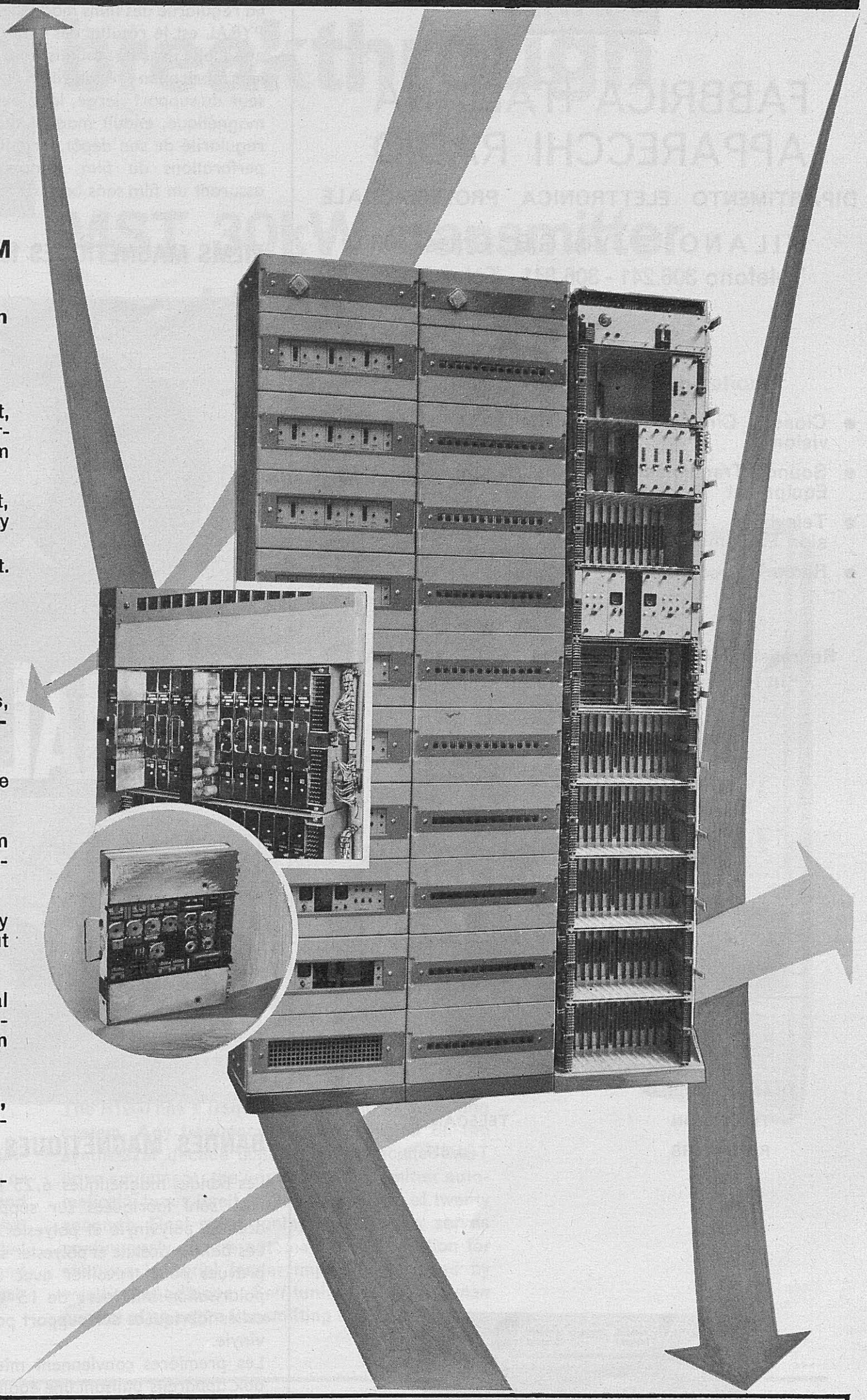
Expandability. Future expansion by plugging-in of additional units without interference with operating circuits.

Operation over any type of coaxial cable or microwave links. Interconnection with other CCITT conform systems.

H 63 is now used by the **Netherlands,** the **Finnish,** and **Congo** Post services.

Ask for complete technical information:

CIT — Transmission Département
33, rue Emeriau PARIS 15e
Tel. 734.89.79.
Telex 25.927 PARIS.



COMPAGNIE GÉNÉRALE D'ÉLECTRICITÉ

LES CÂBLES DE LYON

CIT-COMPAGNIE INDUSTRIELLE DES TÉLÉCOMMUNICATIONS

FIAR

FABBRICA ITALIANA APPARECCHI RADIO

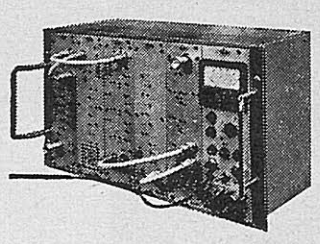
DIPARTIMENTO ELETTRONICA PROFESSIONALE

MILANO - Via G.B. Grassi, 93
Telefono 306.241 - 306.841 - Telex 31295

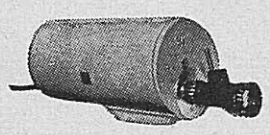
PRODUCTION

- Closed Circuit Television
- Sound Transmissions Equipment
- Television Transmission Equipment
- Radio Transceivers
- Radar and ancillary Equipment
- Electronic Equipment
- Navigational Aids
- Antennas and Accessories

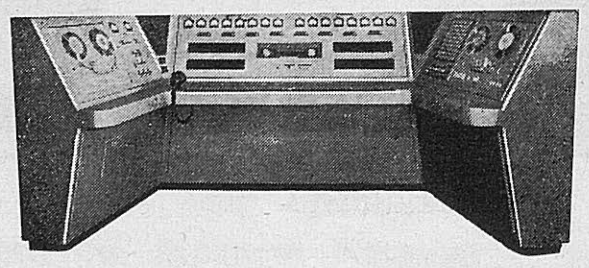
Representative and licencees of TELEFUNKEN AG. in Italy for professional radio equipment.



TRANSISTORISED TELEVISION REPEATERS



TRANSISTORISED TELECAMERA p 817



MIXING DESKS FOR LARGE SOUND TRANSMISSION EQUIPMENT

MULTIPLICITÉ DES CONTROLES SÉCURITÉ DES RÉSULTATS

La régularité des films magnétiques PYRAL est le résultat des contrôles auxquels ils sont soumis lors de leur fabrication : régularité d'épaisseur du support vierge, lot d'oxyde magnétique, enduit magnétique et régularité de son dépôt, largeur et perforations du film, effacement assurant un film sans bruit de fond.

The consistency of properties of PYRAL magnetic film results from the checking operations performed during the manufacturing process : thickness constancy of raw-base, batch of magnetic oxide, magnetic coating mixture and coating constancy , film width and perforations, film being properly erased : which ensures freedom from ground noise.

FILMS MAGNÉTIQUES 16 mm ★ MAGNETIC FILMS 16 mm

BANDES MAGNÉTIQUES 6,25 ★ MAGNETIC TAPE 1/4"

Les bandes magnétiques 6,25 PYRAL sont fabriquées sur support acétate, polyvinyle et polyester.
Les bandes acétate et polyester sont prévues pour travailler avec une polarisation inférieure de 15 % à celles fabriquées sur support polyvinyle.
Les premières conviennent mieux aux appareils utilisant une égalisation conforme aux normes ASA, les secondes sont prévues pour les matériels réglés selon les normes C.C.I.R.

The 1/4'' PYRAL magnetic tapes are manufactured on acetate polyvinyl or polyester.
The acetate and polyester tapes should be used with a bias inferior by 15% to that of the tapes achieved on polyvinyl base.
The first ones are better adapted to equipments using an equalization compatible with ASA standards, whereas the second ones suit equipments adjusted according to the C.C.I.R. standards.

Documentation complète sur demande. Write for full details.

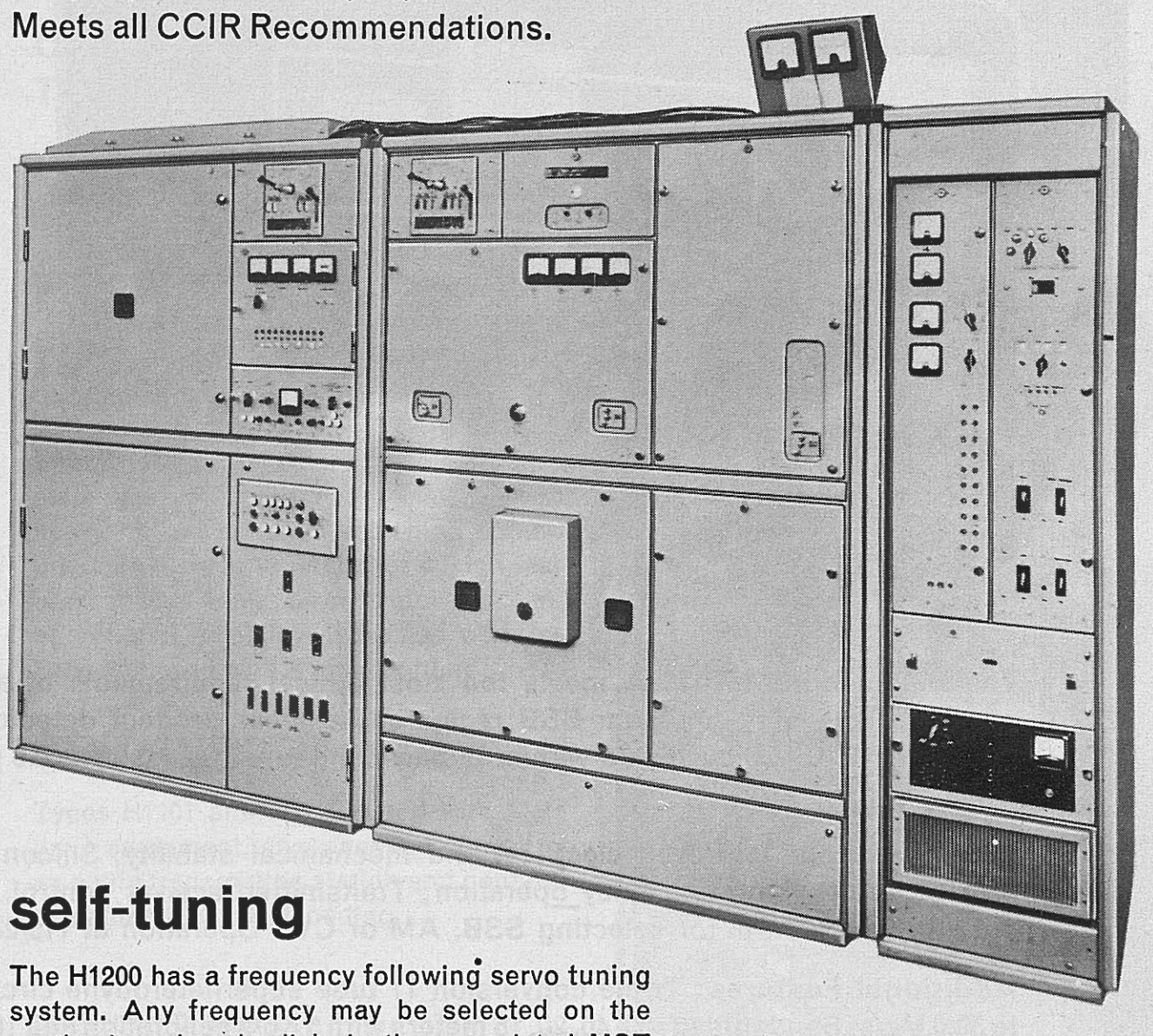
47 RUE DE L'ÉCHAT - CRÉTEIL - (SEINE) FRANCE

Marconi self-tuning H.F system—
the first in the world to be station
planned from input to output.

breakthrough

MST 30kW transmitter type H1200

An h.f linear amplifier transmitter for high-grade telecommunications.
Frequency range: 4-27.5 Mc/s.
Output power: 30 kW p.e.p, 20 kW c.w.
Meets all CCIR Recommendations.



saves 80% floor space

Transmitters can be mounted side by side and back to back or against a wall. Floor-ducts are eliminated and all power supply components are built-in. These features lead to smaller, simpler, cheaper buildings or more services in existing buildings.

rugged reliability

R.F circuits have been simplified and the number of mechanical parts reduced to a minimum. Highest engineering standards are applied to the design of these parts: stainless steel shafts in ball-bearings in heavy, rigid, machined castings; stainless steel spur gears meshing with silicon bronze; heavy r.f coil contacts with high contact pressure. Specified performance is maintained with ample margins.

simplicity

MST reliability allows continuous un-attended operation with extended or remote control, saving maintenance and operating staff. Any fault in the servo control circuits can quickly be located with simple test routines. Transistors and printed wiring give these circuits maxi-mum reliability.

self-tuning

The H1200 has a frequency following servo tuning system. Any frequency may be selected on the synthesizer decade dials in the associated MST drive equipment; the unattended transmitter auto-matically tunes itself in an average time of twenty seconds. Final stage tuning and loading servos continuously ensure automatic compensation for changes in aerial feeder impedance caused by weather conditions. Self-tuning gives *one-man* control of an entire transmitting station.

Marconi telecommunications systems

The Marconi Company Limited, Communications Division, Chelmsford, Essex, England.

LTD/H51

NEW
HAMMARLUND HQ-180A

the SSB
general coverage
receiver of
unsurpassed quality

The Hammarlund HQ-180A meets the most critical requirements of all operators — commercial and amateur. To insure optimum SSB reception, a linear product detector is combined with selectable sideband, 60 Kc/s third IF and vernier IF passband tuning. Less than 0.8 microvolts CW produces a 10:1 signal-to-noise ratio.

New Features: Improved electrical and mechanical stability; Silicon rectifiers in the power supply provide cooler, high efficiency operation; Transmitter/receiver control socket; 500 and 3.2 ohm audio output; BFO control for selecting SSB, AM or CW. Operation at 115/230 V, 50/60 cycles.

Additional Features: Triple conversion 17 tube superheterodyne circuit, Frequency Range: 540 Kc/s to 30.0 Mc/s; Bandspread: 80, 40, 20, 15 meters with 5 Kc/s calibration and 10 meters with 10 Kc/s calibration; 0-100 logging scale; Variable AVC attack; Crystal Calibrator. Also available HQ-180AX with 11 Crystal Controlled Channels.

For full technical description and prices write to:

HAMMARLUND MANUFACTURING COMPANY INC.

Export Department, 13 East 40 Street, New York, N. Y., U.S.A., 10016 — Cables: ARLAB

Marconi Self-Tuning H.F System
—the first in the world to be station planned from input to output

breakthrough

MST 7½kW transmitter H1100 series

An h.f linear amplifier transmitter for high-grade telecommunications.
Frequency range: H1100 and H1101, 4—27.5 Mc/s
H1102 and H1103, 2—27.5 Mc/s
Output power: 7—8 kW p.e.p, 5—6 kW c.w.
The H1100 series meets all CCIR Recommendations.

saves 85% floor space

Transmitters can be mounted side by side and back to back or against a wall; built-in cooling fan; no external air-ducts. These features lead to smaller, simpler, cheaper buildings or more services in existing buildings.

simplicity

R.F circuits have only three tuning controls and two range switches. Final valve can be replaced in 30 seconds. Miniature circuit breakers (used instead of fuses throughout) can be reset instantly. All sub-assemblies are easily tested because they are electrically complete units.

rugged reliability

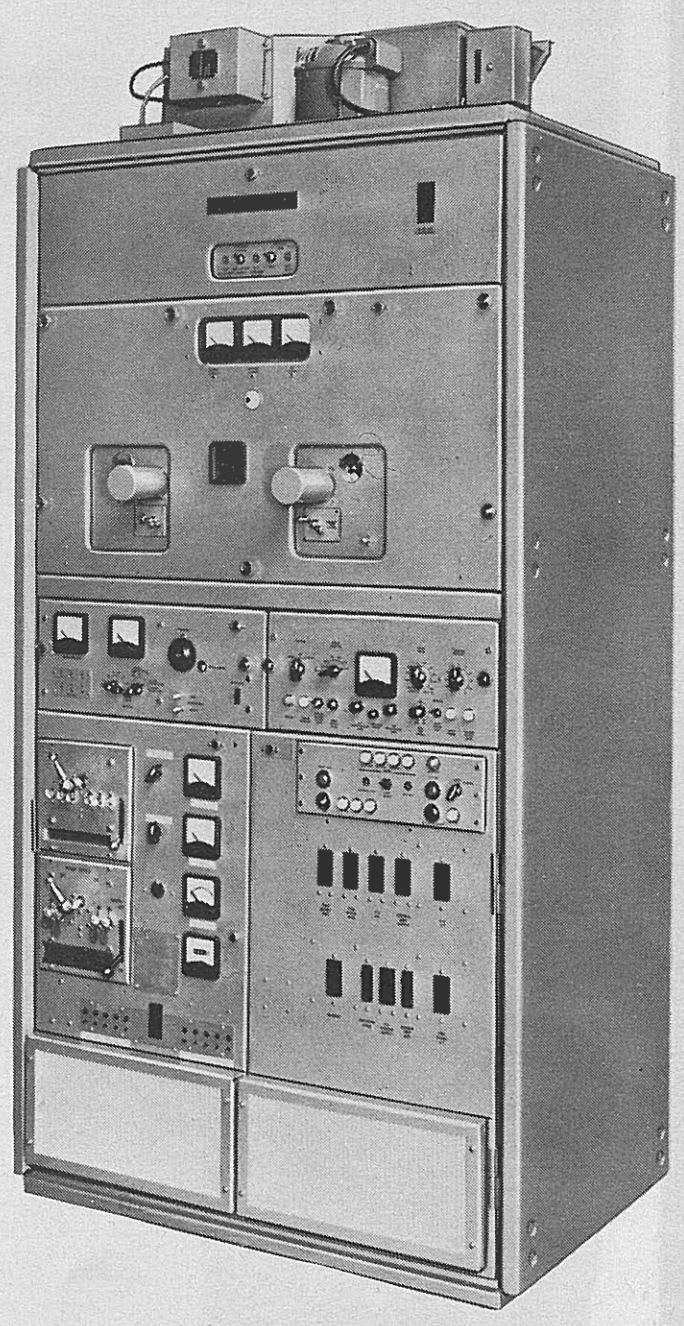
Stainless steel shafts in ball-bearings in rigid machined castings; stainless steel spur gears meshing with silicon bronze; heavy r.f coil contacts with high contact pressure—some examples of design features giving long term endurance and operational reliability. Specified performance achieved with ample margins.

self-tuning

Types H1101 and H1103, used with MST drive equipment, give *one-man* control of an entire transmitting station and continuous automatic aerial loading.

MANUAL TUNING

Manually tuned versions, types H1100 and H1102, are available which, when fitted with built-in drive units, become entirely self-contained transmitters for four spot frequencies and all types of modulation.
Manual tuning takes less than 60 seconds.



Marconi telecommunications systems

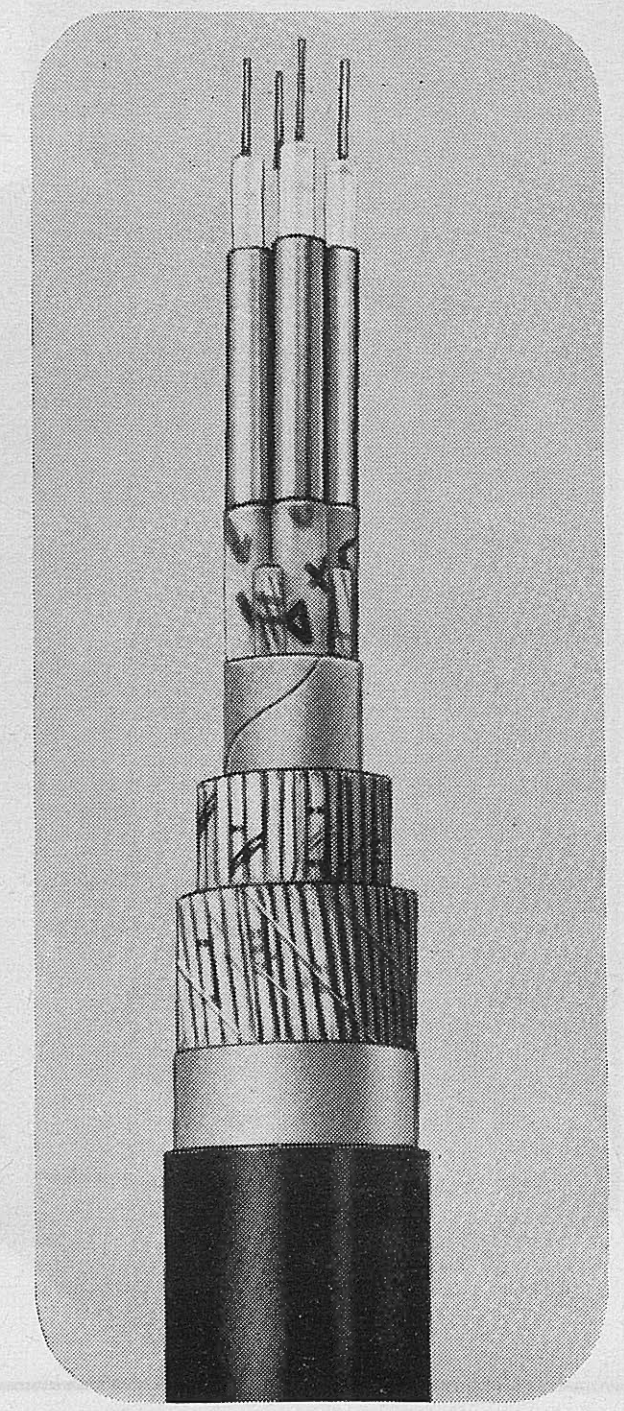
The Marconi Company Limited, Communications Division, Chelmsford, Essex, England

LTD/H50

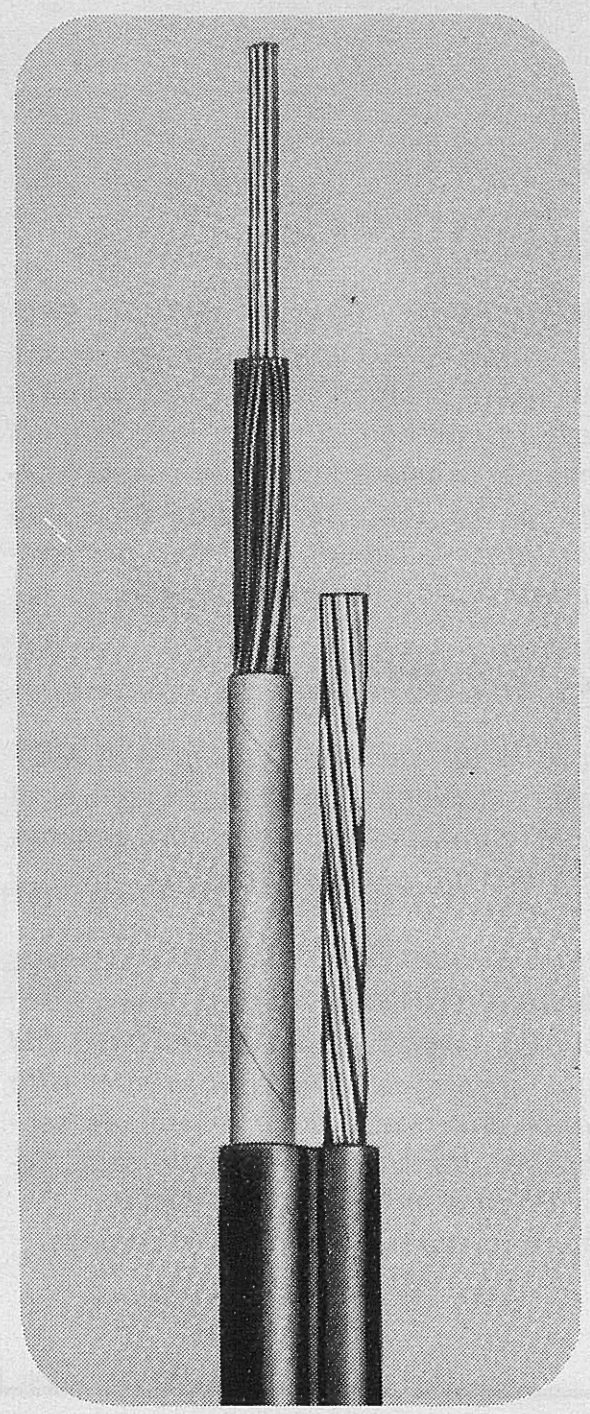
telephone cables from

TCL

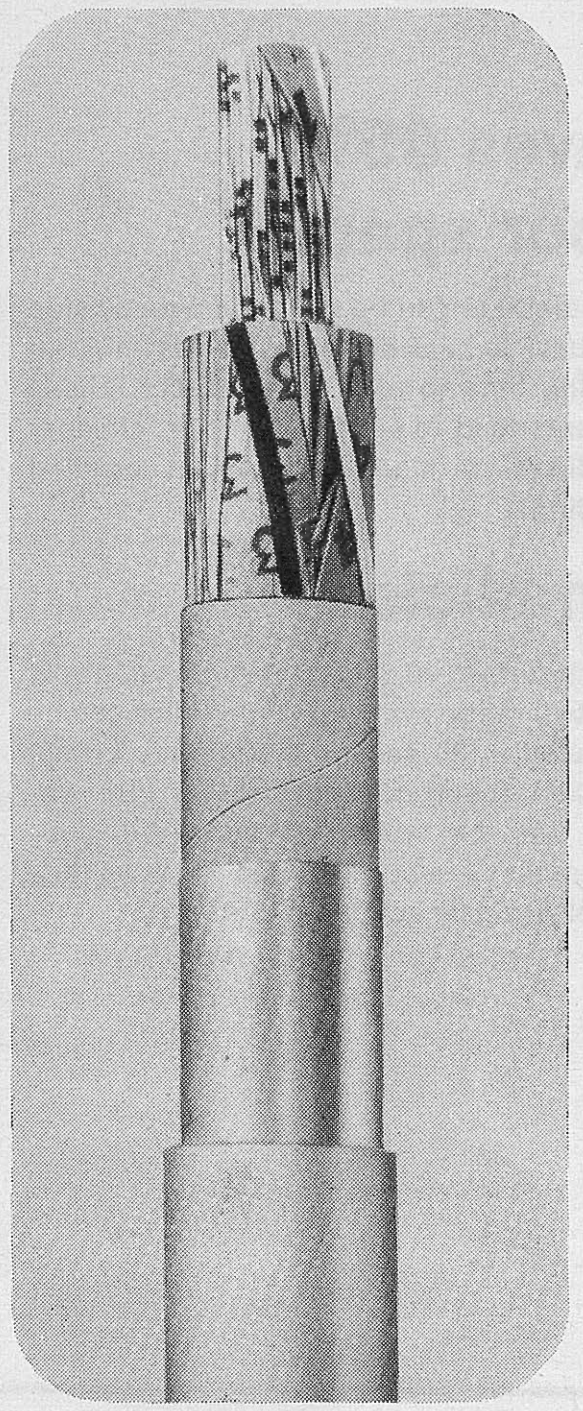
TCL are the largest company in Europe exclusively concerned with the manufacture and supply of telephone cables. The range is extremely comprehensive covering dry-core and plastic cables for every purpose. A selection of TCL cables is shown below. A complete technical advisory service is at your disposal.



4 tube coaxial cable having .174 ins. tubes and audio pairs with lead sheath.



15 pair 6½ lb. (0.51 mm.) conductor self-supporting aerial cable. Plastic sheath and insulation.



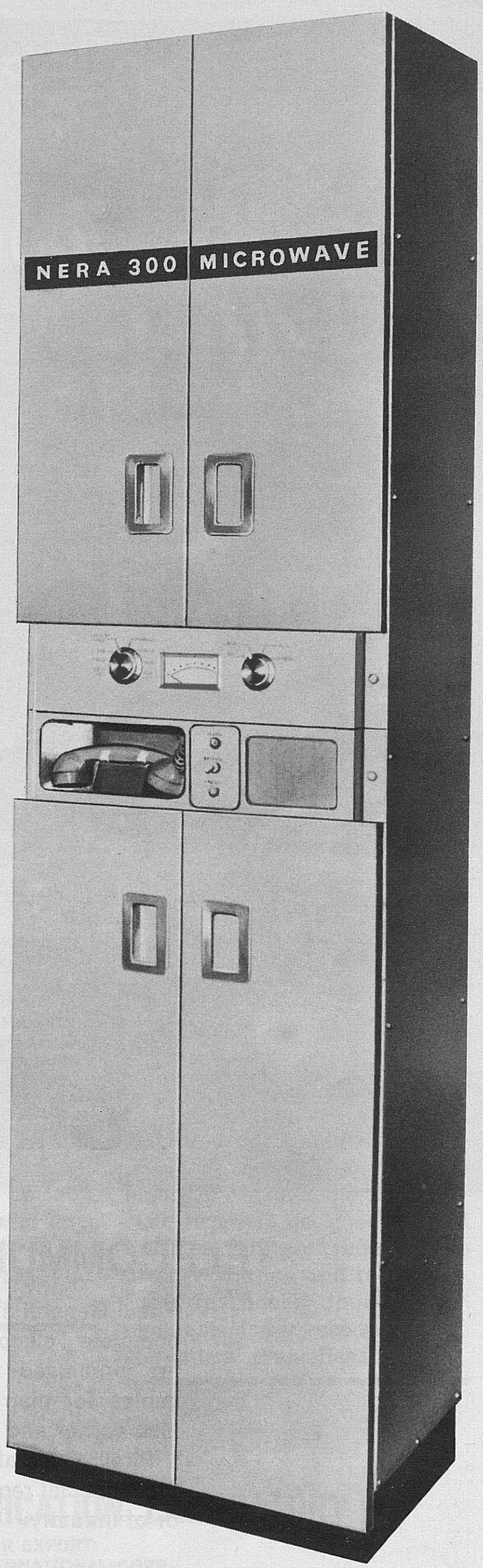
200 pair 6½ lb. (0.51 mm.) unit twin cable having paper insulation and TCL's moisture barrier plastic sheath.

TELEPHONE CABLES LIMITED Dagenham England. Telephone: DOMinion 6611. Cables: Drycore Dagenham.

THE ORGANISATION WITH 125 YEARS' EXPERIENCE.

NERA

PRESENTS
300 channel microwave system
Total solid state



TOTAL SOLID STATE TRANSMITTER AND RECEIVER
. . . . . no klystrons

TUNNEL DIODE PRE-AMPLIFIER
. . . . . low noise figure

HETERODYNE REPEATERS
. . . . . low intermodulation

DIRECT BATTERY OPERATION
. . . . . low power consumption

CRYSTAL CONTROLLED LOCAL OSCILLATORS
. . . . . no AFC problems

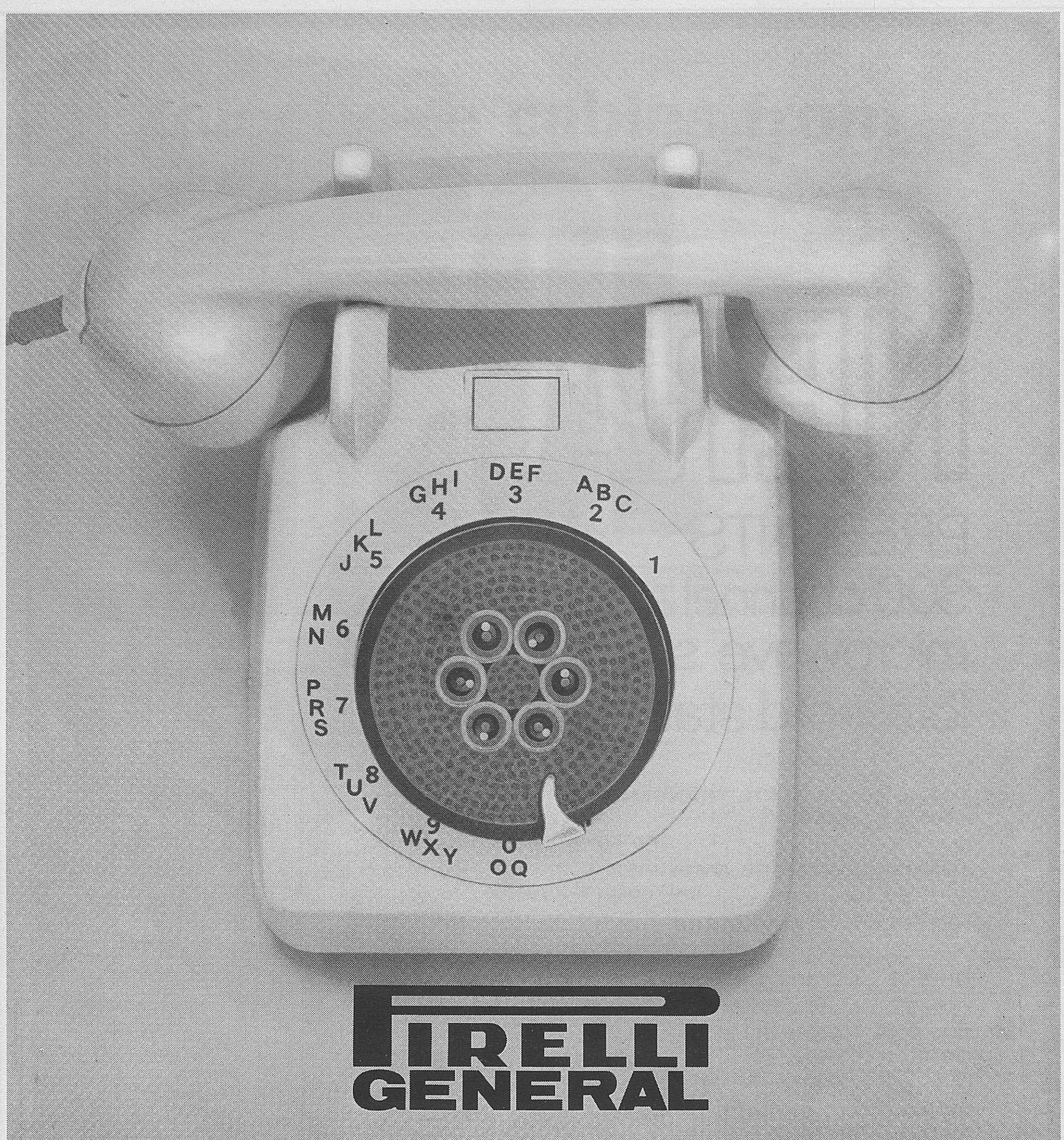
SOLID STATE SERVICE CHANNEL AND ALARM SYSTEM
. . . . . no relays

SOLID STATE SWITCHING
. . . . virtually no switching interruption

COMPLETE TWO WAY DIVERSITY REPEATER IN ONE SINGLE CABINET
. . . . . small space requirements

NERA

MANUFACTURERS OF MICROWAVE AND ELECTRONIC EQUIPMENT
HEAD OFFICE & SALES: P.O.BOX 7033 H OSLO 3, NORWAY - TELEPHONE 46 19 50 - TELEX 1144 - CABLE „WIRELESS"
DEVELOPMENT & WORKS: P.O.BOX 2382 BERGEN, NORWAY



PIRELLI GENERAL

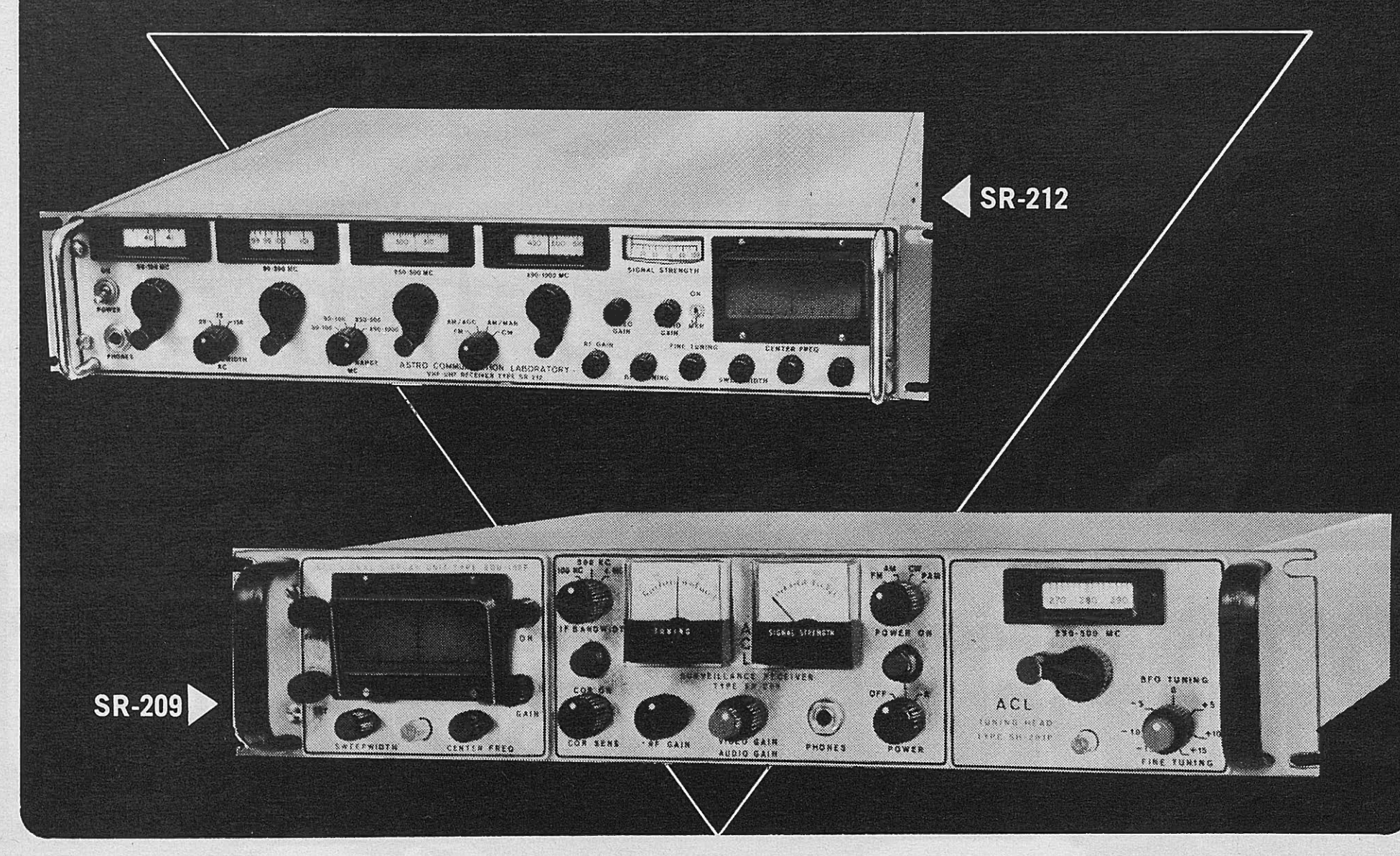
TELECOMMUNICATIONS CABLES

Pirelli General are in a position to advise on complete Telecommunications schemes and are organised to manufacture and install cables for distribution and trunk services; also carrier and all types of coaxial cables.

Pirelli General also manufacture cables to meet special requirements of Public Utilities or of industry.

PIRELLI GENERAL CABLE WORKS LIMITED SOUTHAMPTON TELEPHONE SOUTHAMPTON 20381

solid state modular **SURVEILLANCE** receivers



SR-209 for the reception of AM, FM, CW, and pulse signals in the 30 mc to 2 gc range – covered through the use of five plug-in, RF tuning heads. Features a plug-in signal display unit which may be replaced by an additional RF tuning head or a plug-in battery pack. Plug-in IF bandwidth amplifiers are available from 10 kilocycles through 4 megacycles, with matching AM and FM demodulators.

SR-212 for the reception of RF signals in 30 mc to 1 gc range in either fixed-station or portable applications. Supplied with three IF's, 20 kc, 75 kc, and 150 kc, the SR-212 is an integral, ready-to-operate VHF-UHF receiver.

ASTRO COMMUNICATION LABORATORY now offers a complete family of "state-of-the-art" solid-state receivers designed to meet the most stringent requirements of surveillance and telemetry. Inquiries based upon special requirements will receive immediate, critical evaluations.

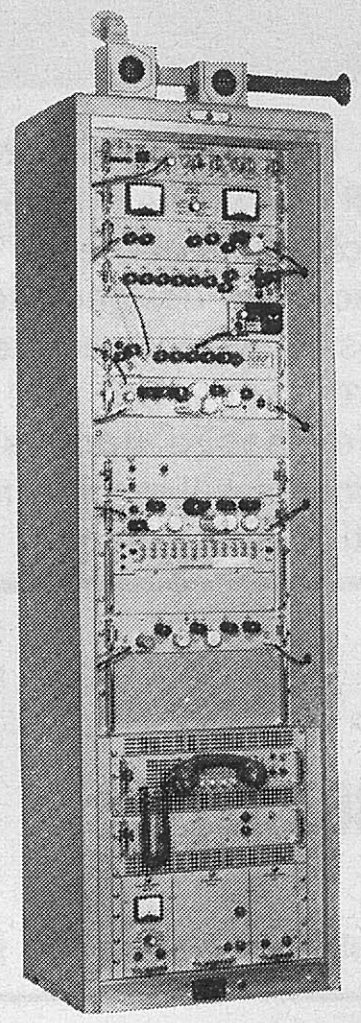
ACL

ASTRO COMMUNICATION LABORATORY

FOR EXPORT:
ROCKE INTERNATIONAL CORP.
13 East 40th Street New York, N.Y. 10016 **Cables: ARLAB**

Portable and Fixed Station Equipment for

MICROWAVE TELEVISION LINKS



The Pye PTC. M1000 microwave equipment is available in both portable and fixed versions for the transmission of television programmes, including sound, over long distances. With one watt transmitter power, excellent performance can be maintained over single links of up to 50 miles or more. Operating frequencies can be anywhere in the band 5925-7750 Mc/s, with excellent frequency stability. In portable form, complete link comprises four luggage type cases plus aerials and tripods, and is easily assembled on site. Fixed type equipment is mounted in six foot enclosed cabinets.

PYE TELECOMMUNICATIONS LIMITED

CAMBRIDGE · ENGLAND · TEL: TEVERSHAM (CAMBRIDGE) 3131 · TELEX 81166

FROM GT&EI – WORLDWIDE HELP FOR YOUR COMMUNICATIONS PROJECT

GT&EI has a unique ability to focus *worldwide* resources on a communications project.

Take the telecommunications network now being built in Trinidad and Tobago, West Indies.

Financing, design, engineering and supply help are coming from Italy, Puerto Rico and three locations in the U.S.A. The supervising team is drawn from GT&EI (U.S.A.), and two subsidiaries—Automatic Electric in Colombia, Lenkurt in Canada; the training staff from U.S.A. and Canada.

Trinidad is only an example. Our widespread skills have also been used in Australia, Argentina, New Zealand, Venezuela, Uruguay, Panama, Tunisia, Morocco. In more than 30 countries, in recent years.

Each part of the GT&EI complex has *specialized* capabilities. *All* are available to you from one source. So you can be sure of the most reliable and economical answers at every stage—from initial idea through system installation, operation and maintenance.

How can you call upon the capabilities of GT&EI? Contact your GT&EI representative. This map shows how near he is.

If you have a telecommunications job to be done, a call, telegram or letter will bring him to your office. Or write to General Telephone & Electronics International, Telecommunications Division, 730 Third Avenue, New York, New York 10017.
Cable: GENTELINT U.S.A. NEW YORK.

GT&EI

GENERAL TELEPHONE & ELECTRONICS INTERNATIONAL

GLOBAL RESOURCES

GT&EI WORKS AROUND THE WORLD

Broadcasters Depend on Collins' High-Power Transmitter with Advanced Design and Superior Performance

The Collins 821A-1 is the only 250 kw transmitter with these exclusive features:

20-SECOND TUNING Change frequencies automatically in the 3.95 to 26.5 Mc/s range in a maximum of 20 seconds . . . during normal station-break periods. With rapid frequency changes, you'll save an average of one hour of "on-air" time daily. Automatic tuning enables inexperienced personnel to operate the transmitter. Built-in safety precautions prevent damage to the transmitter during the tuning cycle.

HIGH-EFFICIENCY TANK CIRCUITS Advanced-design tank circuits eliminate troublesome conventional switched or variable coils. Excessive concentration of current in the line is avoided.

OPERATING ECONOMY AND HIGH RELIABILITY PA tank losses as low as 3%, with at least 80 db of harmonic attenuation. Higher reliability is insured by reduced heating, lower power required from r-f drivers, use of silicon rectifiers, and generous safety margins in design of power components.

DIAGNOSTIC CONTROL PANEL Provides the operator with a visual display of the 821A-1 circuitry from the r-f oscillator, the audio inputs, throughout the transmitter, including the automatic tuning. The control center alerts for abnormal conditions and localizes the trouble area.

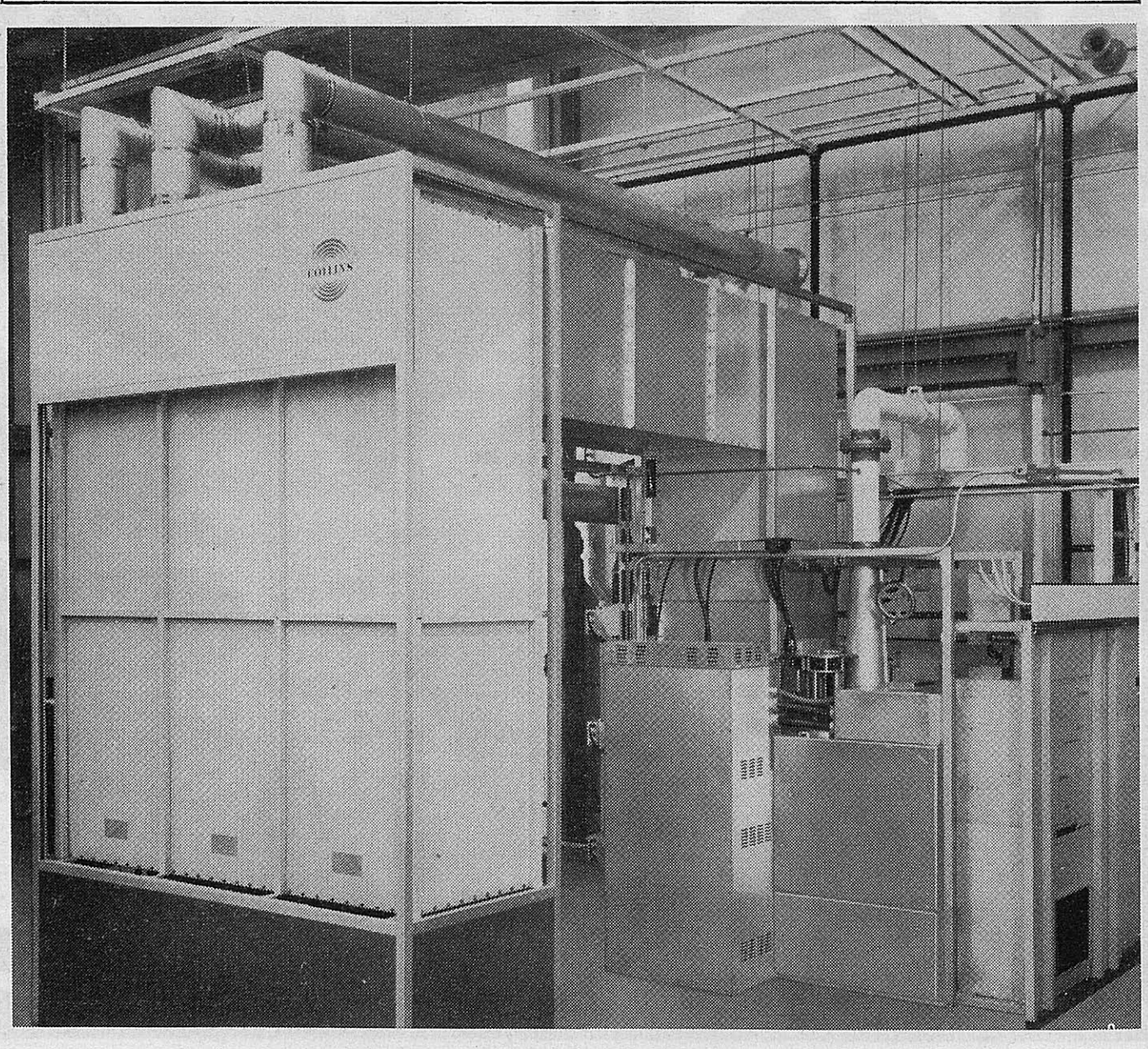
REMOTE OPERATION A control console permits operation of the transmitter up to 150 feet away, or with auxiliary terminal equipment, complete long distance remote operation.

COMPACTNESS AND EASE OF INSTALLATION Collins' three-section design — high-voltage vault, high-voltage enclosure containing the r-f and modulator sections, and the control center — coupled with remote capability, offers great flexibility for installation. ENTIRE SYSTEM OCCUPIES LESS THAN 75 SQUARE METERS. A modern 250 kw transmitter designed into yesterday's 50 kw space.

Collins' reputation as leader in the broadcast industry has been built on high-performance equipment and total capability. World-wide regional offices offer technical assistance for everything from specialized antenna and transmission line requirements to complete transmitter installation and maintenance service. For more detailed information on the Collins 821A-1 Transmitter, contact the Regional Office nearest you.

Send for the new descriptive 821A-1 Brochure

Write to: COLLINS RADIO COMPANY
World Headquarters
Dallas, Texas, U.S.A.



COLLINS RADIO COMPANY
Melbourne • Frankfurt • Mexico City • London • Wellington • Beirut • Paris • Rome • Hong Kong • Singapore • Johannesburg • Toronto • International Division, Dallas, Texas

COLLINS

G.N.T.

TELEPRINTER MODEL 5

Modern in design,
versatile in performance,
reliable in operation

GREAT NORTHERN TELEGRAPH WORKS

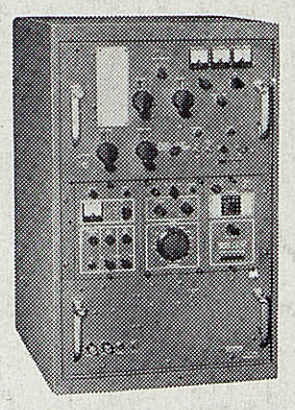
SYDHAVNS PLADS 4 · COPENHAGEN SV · DENMARK
TELEGRAMS: NORTELWORKS COPENHAGEN, TELEPHONE 216883, TELEX 5068
LONDON OFFICE: 5, ST. HELEN'S PLACE, LONDON E.C.3

Most exciting exciter in SSB

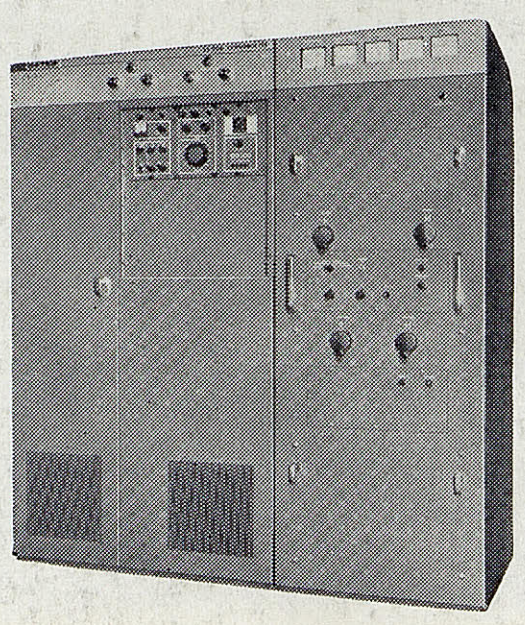
. . . now in Gates' complete line of SSB transmitters

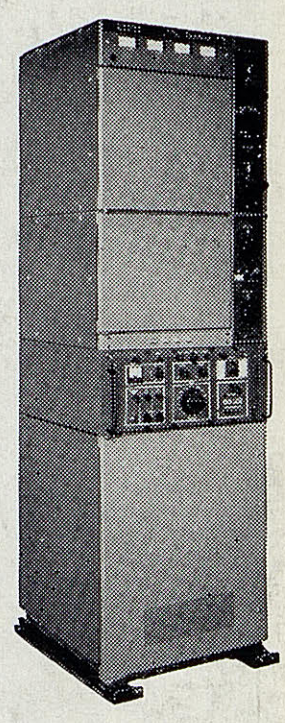
This exclusive SG-70 Sideband Generator gives you finger-tip tuning! And it is the "heart" of all Gates SSB Transmitters. Designed for operation on any one of 10 crystal-controlled positions, it provides 150 possible channels in the 2-32mc. range. All tuning is accomplished by only six front-panel controls and one channel selector. Provides accurate and rapid channel change and rapid front-panel tune-up.

Gates SSB Transmitters . . . from 1KW to 20KW PEP . . . have solid-state power supplies, provide high-average power ratings and exceptional frequency stability in all operating modes. Two independent sidebands. Write for brochures.



ST-1A, 1,000-watt PEP





ST-3A, 3,000-watt PEP

ST-10A, 10,000-watt PEP
and
ST-20A, 20,000-watt PEP

HARRIS INTERTYPE CORPORATION

GATES

GATES RADIO COMPANY
A Subsidiary of
Harris-Intertype Corporation
QUINCY, ILLINOIS 62302

Offices: New York, Houston, Los Angeles, Washington, D. C.
Export: Rocke International Corporation, New York City
In Canada: Canadian Marconi Company, Montreal